AUGUST 13, 1960

Chemical Week

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BENZENE POT BOILS..... P. 41

Drugmakers' double trouble–tighter policing; further probing .....p. 23

Brazil's buildup: foreign capital fuels fast-paced CPI growth ....p. 28

Chambers of Strategic Materials readies four new Udy projects ...p. 85

Valve target: better actuators

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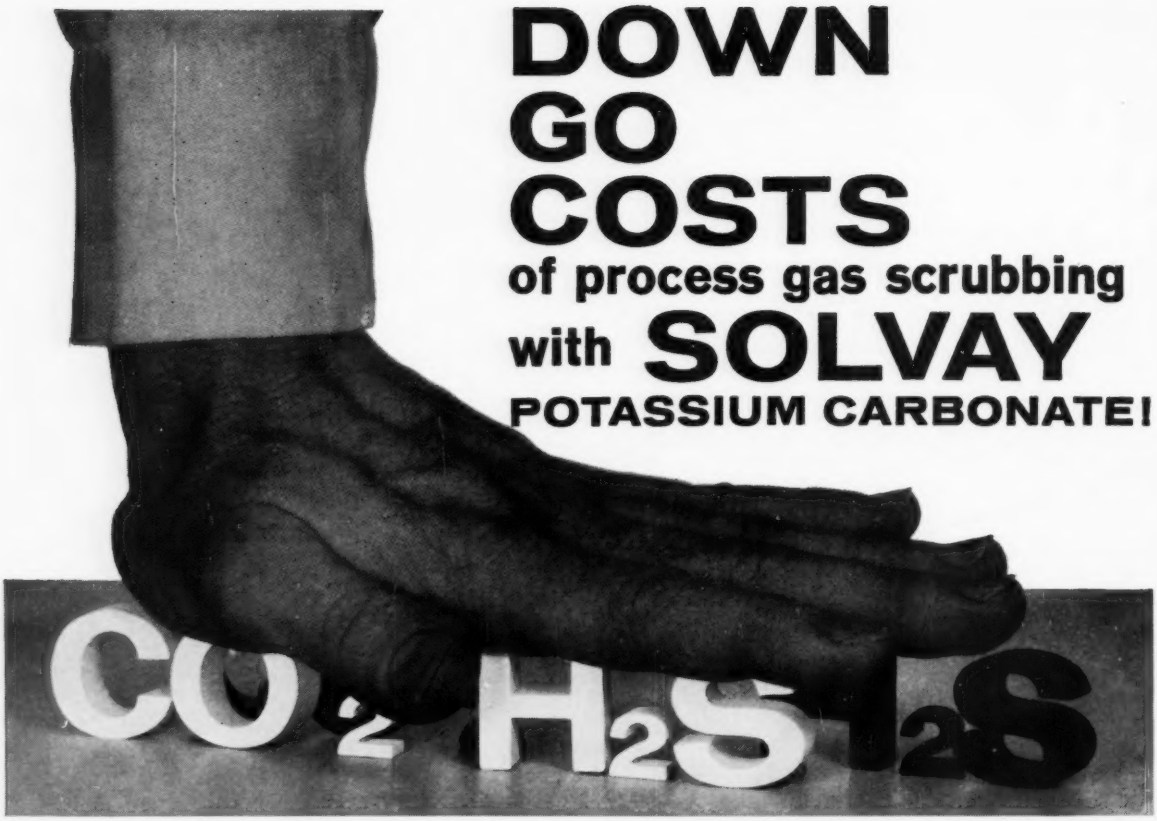

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- ☐ "Improved Process for CO_2 Absorption"—Chemical Engineering Progress.
- ☐ "Hot Potash Process for Gas Purification"—Oil and Gas Journal.
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- ☐ "New Potassium Carbonate Process"—Petroleum Refiner.
- ☐ "Solvay Potassium Carbonate" fact book.

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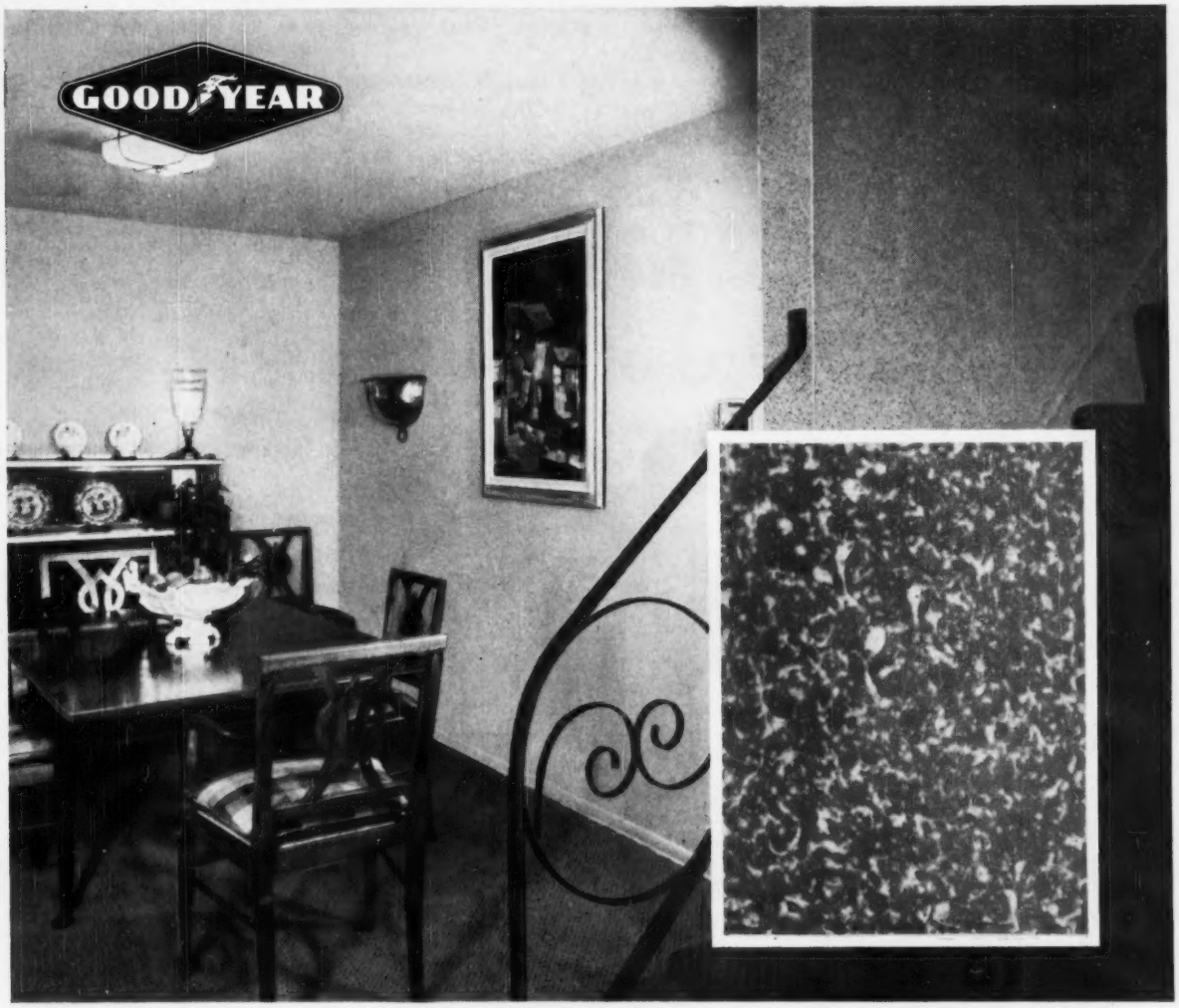
18-80

Photograph taken in model home, Sayre Woods South, Madison Township, N. J., through the courtesy of United Lacquer Company, Inc., Linden, N. J.



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Chemical Division

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ON THE COVER: Frank W. Chambers took over presidency of Strategic Materials Corp., Inc. this spring, moving up from the executive vice-presidency. He heads a company banking heavily on a venturesome new technology.

Chemical Week

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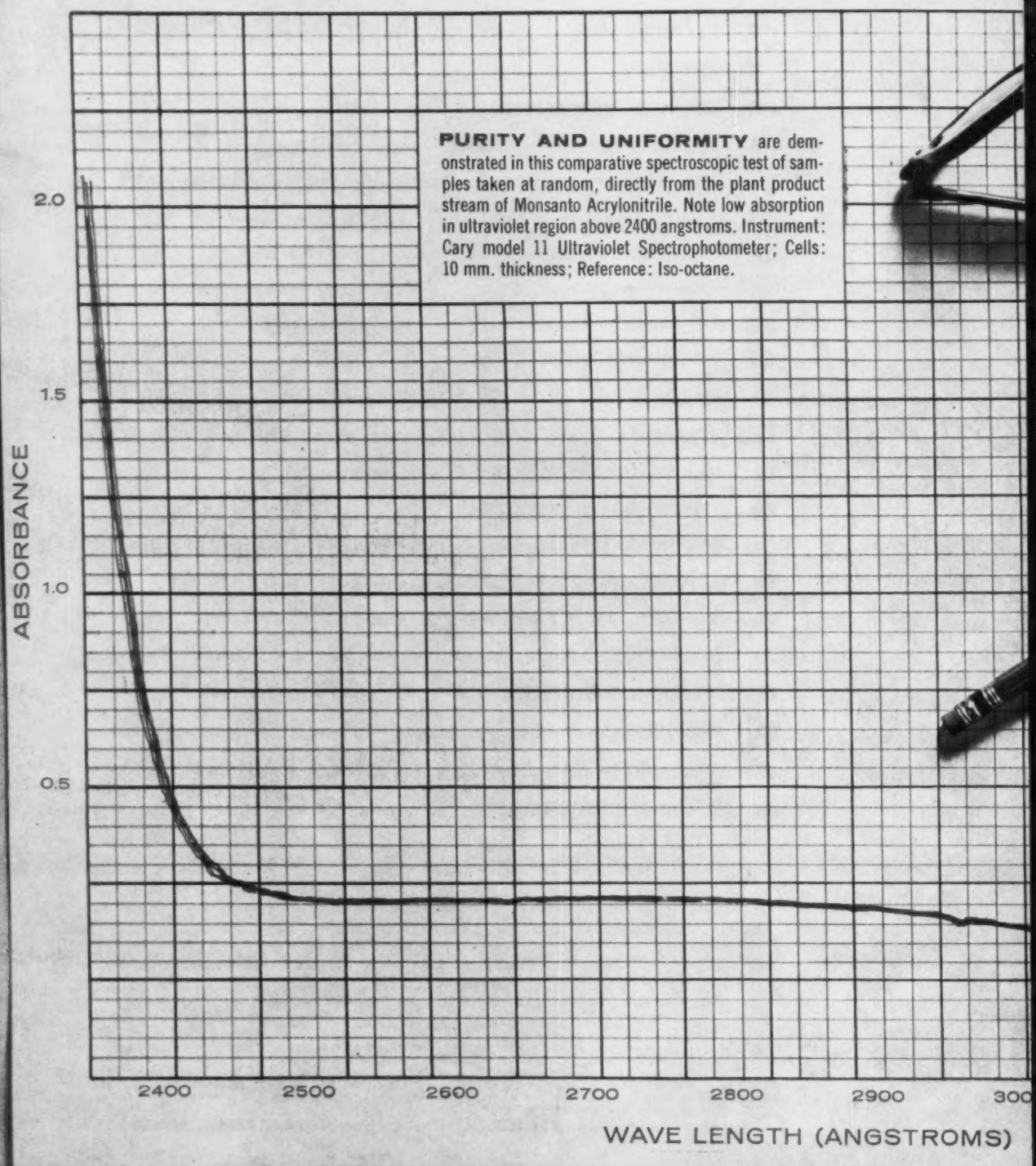
PURITY AND UNIFORMITY are demonstrated in this comparative spectroscopic test of samples taken at random, directly from the plant product stream of Monsanto Acrylonitrile. Note low absorption in ultraviolet region above 2400 angstroms. Instrument: Cary model 11 Ultraviolet Spectrophotometer; Cells: 10 mm. thickness; Reference: Iso-octane.
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1.0
0.5
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2600
2700
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2900
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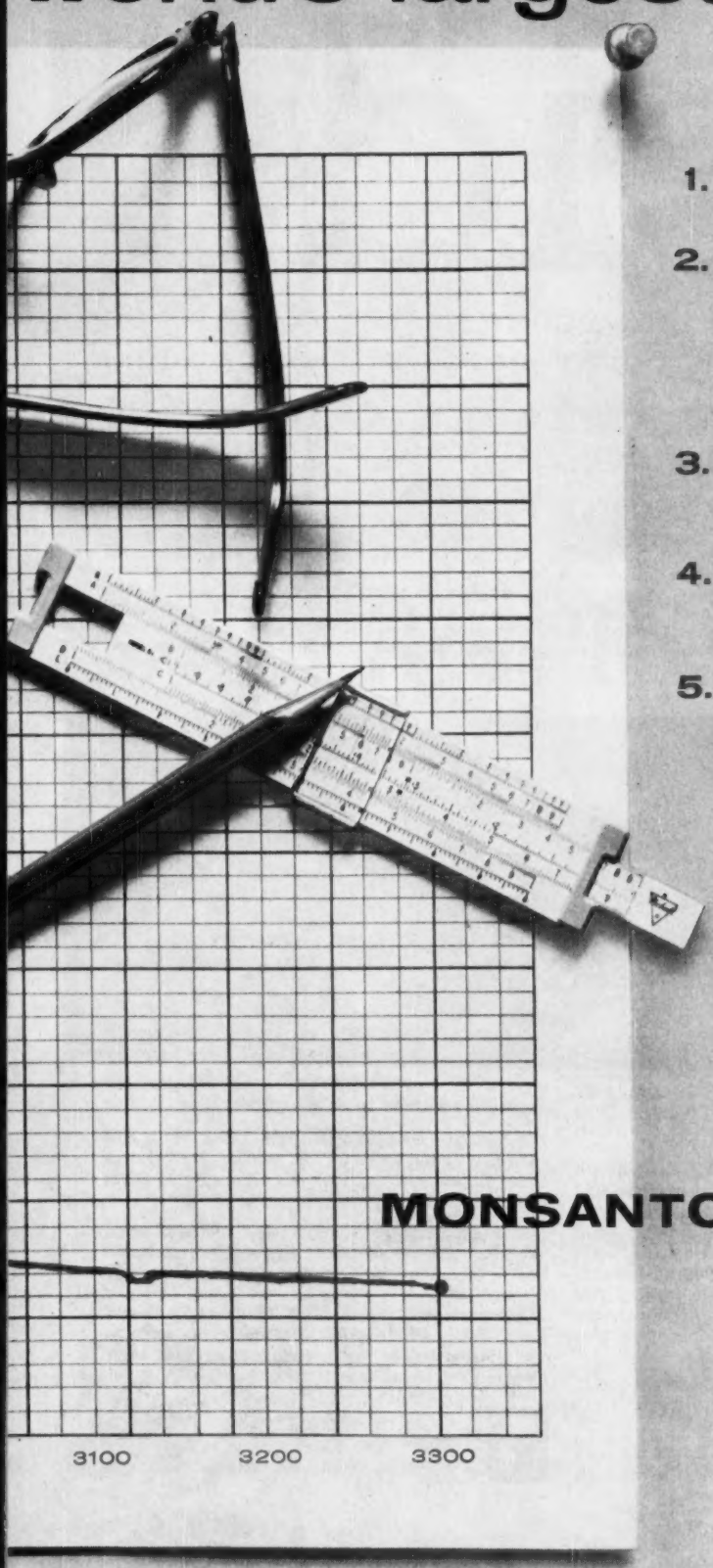

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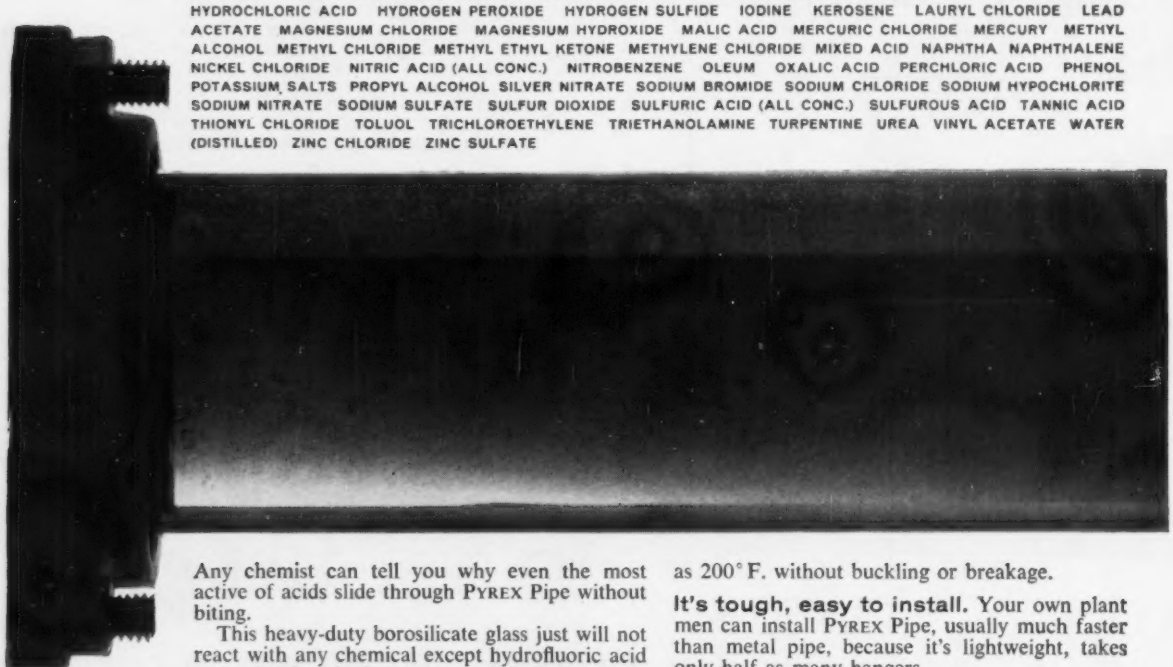

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You can see through it. You can see inside this pipe, spot trouble immediately, locate it exactly.

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Heat exchangers and drainlines, too. We also make a complete line of PYREX brand heat exchangers and laboratory drainlines and fittings.

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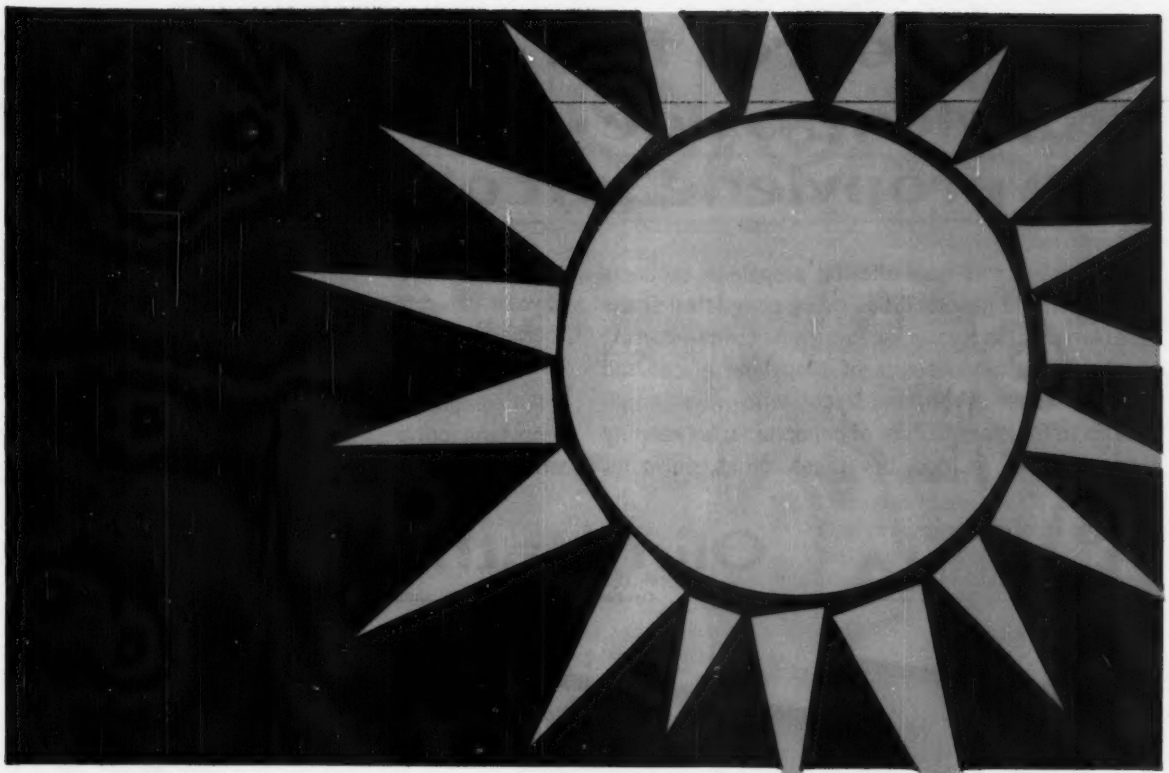

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2-NP ($CH_3CHNO_2CH_3$) is an extraordinarily versatile member of the CSC Nitroparaffin family. Its most important property is its strong solvent power for a wide variety of materials including many natural resins, synthetic resins, coating materials, dyes, organic chemicals and fats and oils. Of special interest is the cosolvent effect of 2-NP and/or toluol and alcohol, making it an outstanding solvent for many vinyl resins and acrylics. It is a superior solvent for epoxies and cellulosics.

2-NP is to the newer coatings what butyl acetate has been to nitrocellulose – an ideal solvent. 2-NP's evaporation rate permits maximum flow and leveling without delaying drying time.

Unlike ketones, 2-NP in vinyls eliminates problems of solvent residue and solvent odor, too. It has several safety features such as relatively high flash point and a high lower-flammability limit of vapors in air. Write for all the literature that details how CSC's 2-Nitropropane can brighten your day.

Evaporation Rate of 2-NP Compared to Other Solvents (volume)

Acetone	975
MEK	568
Toluol	197
MIBK	186
2-NP	110
n-Butyl Acetate	100
Xylol	69
Cellosolve	38
Isophorone	4.3

Flash Points (°F Tag Open Cup) of 2-NP Compared to Other Solvents

Acetone	16
MEK	30
Toluol	56
MIBK	81
Xylol	85
n-Butyl Acetate	92
2-NP	103
Cellosolve	126
Isophorone	202

Comparison of Lower Limit of Flammability of 2-NP With Other Solvents (% by volume in air)

MIBK	0.9
Xylol	1.0
Toluol	1.27
n-Butyl Acetate	1.7
MEK	1.8
Acetone	2.15
2-Nitropropane	2.6
Cellosolve	2.6

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LETTERS

Dow Corning's Silicon

TO THE EDITOR: I have just read your interesting article (*July 16, p. 64*) on hyperpure silicon and wish to call your attention to one omission. Dow Corning took a license under the Westinghouse-Siemens process a year ago and is now building a substantial new plant in Saginaw County that will produce polycrystalline and zone-refined single-crystal rods by this superior process.

W. R. COLLINGS
President
Dow Corning Corp.
Midland, Mich.

Several, Not Seven

TO THE EDITOR: The sodium desulfurization process has advantages over hydrogenation for smaller coke-oven aromatics producers, but not quite the advantage indicated (*Technology Newsletter, July 23*).

Your figure of $200,000 investment for a 10,000-gal./day sodium desulfurization unit was correct, but the "around $7 million" quoted for hydrogenation can easily buy two or three such plants. When I spoke to your reporter, he understood it was "several million." Could your typographer have misread it, or was he, perhaps, "thinking big"?

MARTIN FAYE
Product Manager
U. S. Industrial Chemicals Co.
New York

The "several" was garbled in transmission to the printer, was misread as "seven."—ED.

Acheson in Britain

TO THE EDITOR: We have read with more than our usual interest the article "Hidden Opportunities in the European Chemical Markets" (*June 18, p. 133*). We have noted with pride also that the name of our subsidiary, Acheson Colloiden N.V., Scheemda, Netherlands, heads the list of the 863 major chemical producers in Europe.

On the other hand, when we thumbed through the list of the chemical companies located in the United Kingdom, we found . . . that the names of our larger British affiliates were conspicuous by their absence. For the record, therefore, may we call your attention to the [recent] golden jubilee . . . of Acheson Colloids Ltd., one of our British affiliates.

. . . We believe we can lay claim to being one of the pioneers among American chemical industries to set up manufacturing operations in Europe. In those early days there were also plants at Verviers, Belgium; Epinal, France; Novara, Italy; Cantrida, Austria; and Fiume, Serbia. The Continental plants were wiped out in the holocaust of World War I.

In addition to the long-established colloidal graphite business, we now have a three-year-old unit, Acheson Dispersed Pigments Co., near Manchester, England, manufacturing dispersed pigment concentrates for the booming thermoplastics industry in Europe.

JOHN C. SPRAGUE
Vice-President
Acheson Industries, Inc.
Port Huron, Mich.

MEETINGS

Cryogenic Engineering Conference, University of Colorado, Boulder, Colo., Aug. 22-24.

Technical Assn. of the Pulp & Paper Industry, alkaline pulping conference, Multnomah Hotel, Portland, Ore., Aug. 22-24.

Joint Automatic Control Conference, Massachusetts Institute of Technology, Cambridge, Mass., Sept. 7-9.

Synthetic Organic Chemical Manufacturers Assn., meeting, Roosevelt Hotel, New York, Sept. 13.

Chemical Exposition U.S.A. 1960, sponsored by New York section of the American Chemical Society, Statler-Hilton Hotel, New York, Sept. 13-15.

Drug, Chemical & Allied Trades Assn., 70th annual meeting, Sagamore Hotel, Bolton Landing, Lake George, N.Y., Sept. 15-18.

American Assn. of Textile Chemists & Colorists, 1960 national convention, Sheraton Hotel, Philadelphia, Pa., Oct. 6-8.

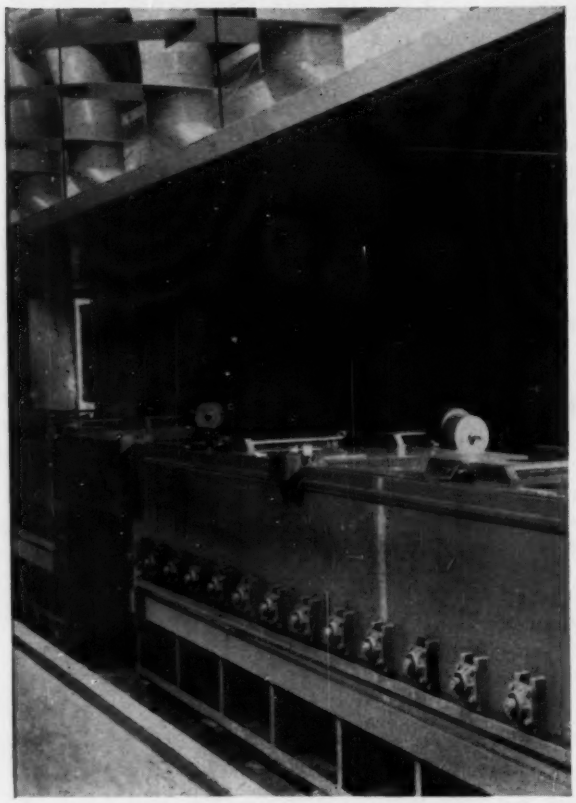
International Plastics Congress, Amsterdam, Holland, Oct. 10-12.

Synthetic Organic Chemical Manufacturers Assn., meeting, Roosevelt Hotel, New York, Oct. 11.

Chemical Market Research Assn.; theme: "The European Chemical Industry"; Wentworth-by-the-Sea, Portsmouth, N.H., Sept. 22-23.

Another new development using

B.F.Goodrich Chemical *raw materials*



Complete acid etching machine of rigid Geon was developed by Industrial Plastic Fabricators, Inc., Norwood, Massachusetts. It is used by Corning Electronic Components, Corning Glass Works, Bradford, Pennsylvania, to produce Fotoform and FOTOCERAM® products like the circuit board shown. B.F.Goodrich Chemical Company supplies the rigid Geon vinyl.

Machine of rigid Geon produces low cost precision etching on glass

"Chemical machining" is the accurate term for the high precision etching on glass done by this new machine. Square-cornered, submicroscopic holes can be produced with small tolerances and close center-to-center distances. Or a precise pattern can be created in glass, whether it involves holes, cut-outs, or channels. Screens with mesh as fine as 560,000 holes per square inch have been produced.

The machine is made of shapes, sheets and rods made of Geon rigid vinyl. Geon is unaffected by the acids that do the etching job. It provides the durability and impact strength needed for fabrication. And it is as easy to handle as any material used for manufacturing.

Here's another example of the way Geon vinyl can open new markets or improve old applications. For more facts, write Department GH-6, B.F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Geon VINYLS

B.F.Goodrich Chemical Company

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Alipal CO-436 is used principally in detergents for dishes and light laundry, and in household cleaners for rugs and hard, waxed surfaces. Also in bubble baths and hair shampoos.

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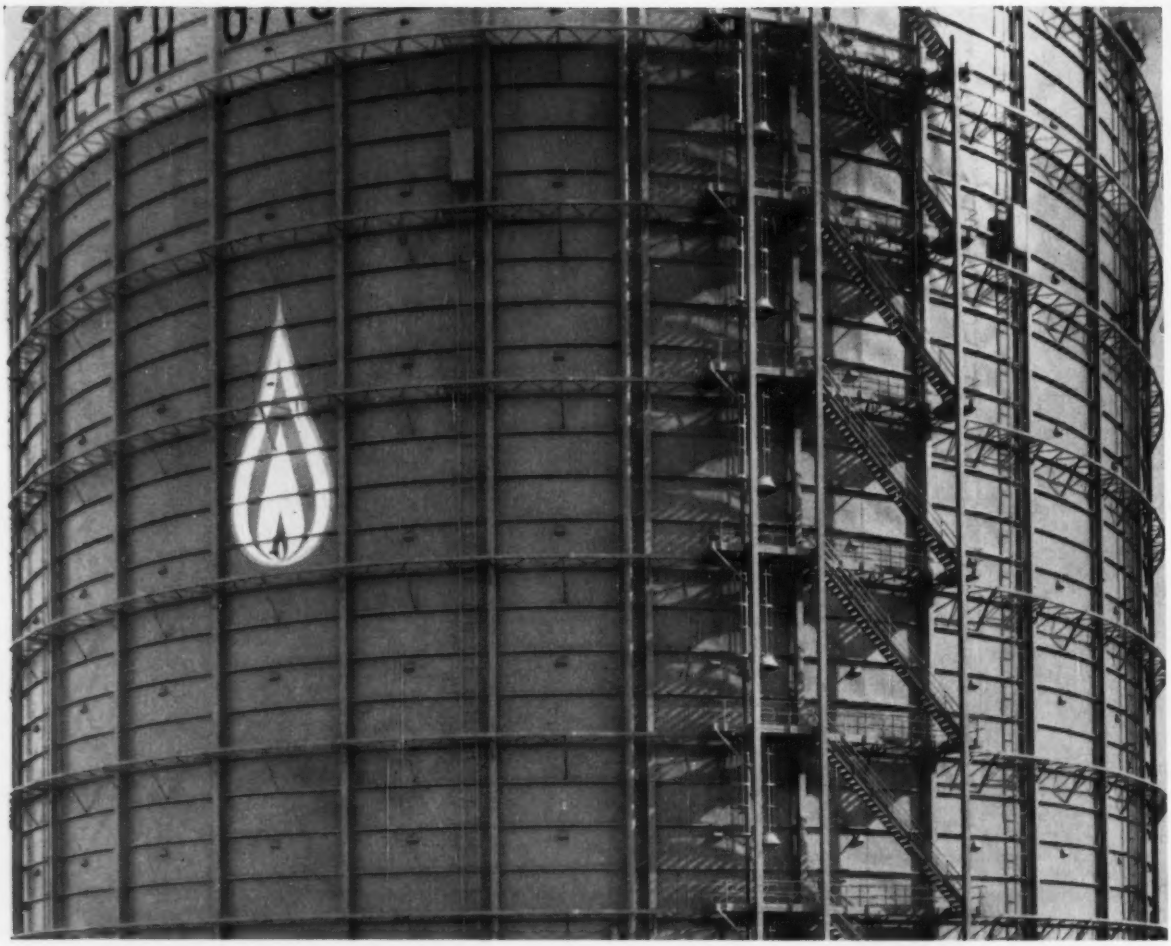

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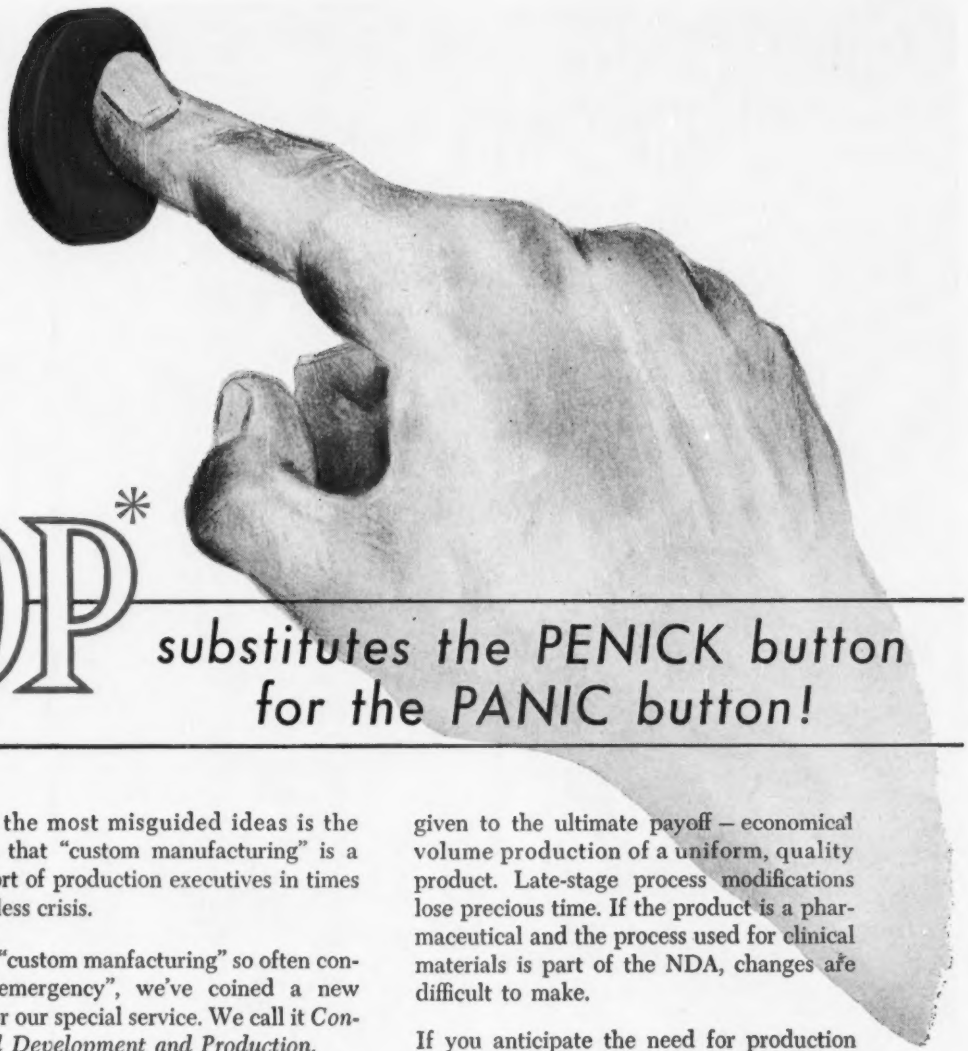

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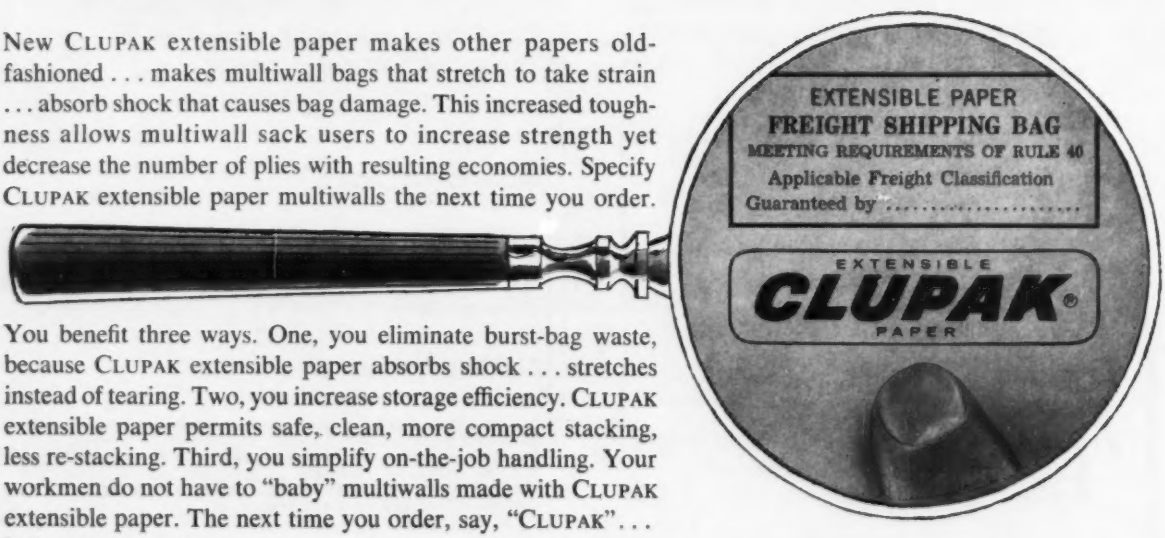

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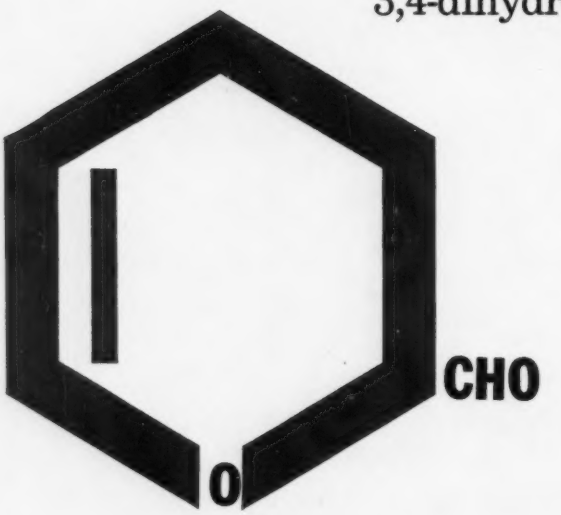

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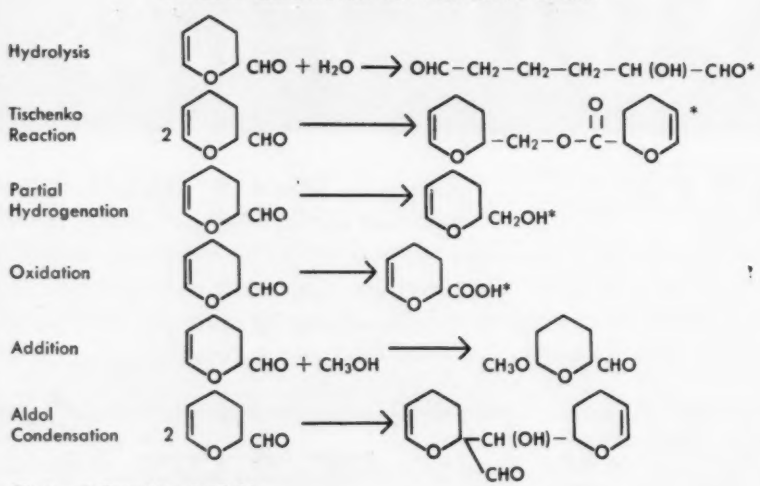

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SHELL

Business
Newsletter

CHEMICAL WEEK
August 13, 1960

Du Pont—about on-target with planned capital expenditures of $220 million for '60—pushed the button last week for two more expansions:

• The company will spend several millions for modernization and expansion of its Wurtland, Ky., sulfuric acid plant and will also establish a new bulk acid terminal near New Cumberland, W. Va. When completed next year, the Wurtland plant will become one of Du Pont's largest acid plants. The new acid terminal is pegged for a 70-acre site near East Liverpool, O., on the Ohio River.

• Work will begin shortly on $9-million expansion of 501-type carpet-nylon capacity at Seaford, Del. The project is set for completion within a year; no capacity figures are given. The move follows closely Du Pont's plans to expand nylon tire yarn capacity at Richmond, Va. (*CW Business Newsletter, June 18*).

•

Brighter prospects for special metals may be at hand: Calumet & Hecla is underscoring its faith in the future market with a construction start on a $1.6-million special metals tube and rod fabricating facility at Inkster, Mich. Slated as first metals to be fabricated there: zirconium and titanium.

The plant is expected to be operating by next Jan. 1, and sales from the plant are expected to hit $2 million by '62. These and other special metals—tantalum, columbium, molybdenum, beryllium and chromium—have been fabricated in pilot plant for five years.

Meanwhile, Vanadium Corp. Chairman W. C. Keeley told New York security analysts last week that although the present state of the ferro-alloy industry was "deplorable," new uses for stainless steel are expected to boost vanadium's future markets. Examples: new color processes for construction uses, the trend toward sandwich panel construction, new gas turbine engines, and antismog exhaust systems for cars.

•

Rexal and El Paso Natural Gas this week are firming plans for their 50-50 joint venture into polyolefin production. Word still isn't out officially, but the companies reportedly have awarded a $24-million contract to Fluor Corp. to build a 120-million-lbs./year polyethylene plant at Odessa, Tex., and are working out plans for a polyolefin research laboratory to go up in New Jersey.

Both the polyethylene plant and the ethylene unit to supply it are geared for late '61 completion. For the ethylene unit, El Paso is expected to award design and construction contracts to Universal Oil Products (Des Plaines, Ill.) and Fish Engineering (Houston), respectively.

Meanwhile, El Paso is beginning its styrene expansion. It's adding 20-million-lbs./year capacity to its 60-million-lbs./year styrene plant at Odessa. The UOP Alkar process will be used in the program; startup is scheduled for this fall.

•

A sobering thought for Senator Kefauver as he prepares to resume his fault-finding campaign against major pharmaceutical companies (*see p. 23*): evidence that big-scale counterfeiting of branded drug products is a serious public-health danger.

Next week in municipal court in Hoboken, N. J., state and local officials will present evidence against General Pharmacal Co. The principal allegation: that General Pharmacal—operating in unsanitary premises and without adequate quality-control testing—has been doing a possibly $50,000/month business based on substandard hormones, tranquilizers and other prescription drugs stamped with names of various leading pharmaceutical firms. If substantiated, this case could be a blow to those who advocate purchase of drugs by generic names.

•

More major Japanese petrochemical expansions are in the works.

• The Sumitomo Zaibatsu—a group of companies, including Sumitomo Chemical—plans a giant petrochemical expansion program that would cost an estimated $400 million, include production of polyethylene, polypropylene, styrene, ethylene oxide, polyvinyl chloride, acrylonitrile, and metacrylic acid. Sumitomo is considering a tie-in with some domestic or foreign oil company to obtain raw materials for its projected complete switch from coal to petroleum as its chemical raw material. It expects consumption of naptha (starting material for the products) to rise from the current 6-7,000 kiloliters/month to 500,000 kiloliters/year within five years. The big move is in part a response to Mitsui's consolidation plans (*CW, July, 16, p. 35*).

• Dow and Japan's Maruzen Oil plan a joint venture to build a $44-million, 10,000-tons/year phenol plant, due onstream the end of '61. Using the toluene route, the plant will drive production costs down to 28¢/kilogram breaking the market monopoly of Mitsui, which produces at 55¢/kilogram with the cumene process. The new project has preliminary government approval, although details are still under negotiation.

•

American Cyanamid will go into Formosa to produce drugs and feed supplements through a new subsidiary set up with Taiwan Sugar Corp. Cyanamid will hold 55% interest. The companies will spend more than $1 million to expand Taiwan Sugar's Hsin-Chu plant, which has been producing antibiotics for animal feed supplements.

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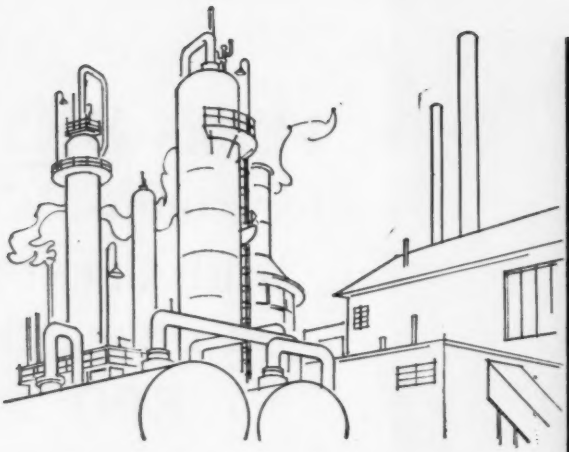
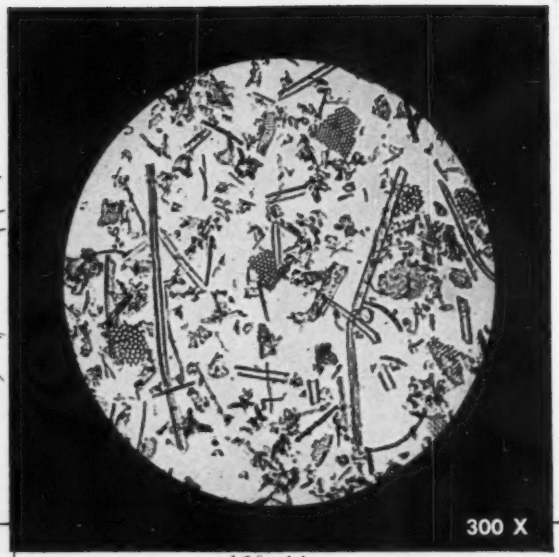
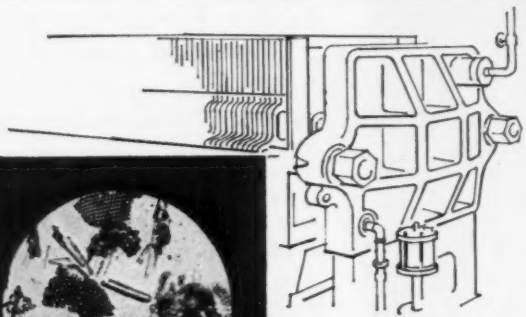
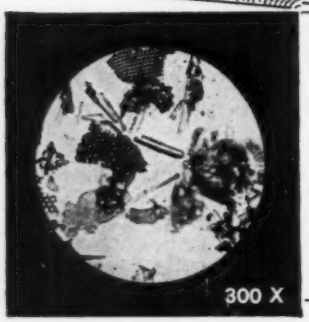


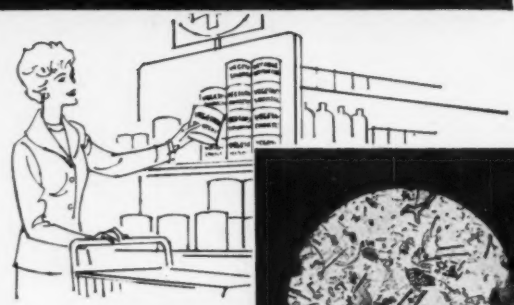


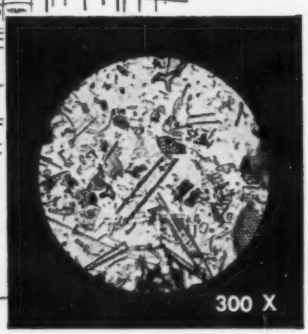
For flow rate plus clarity—Hyflo Super-Cel has the right combination of large and fine particles. Heavily used in chemical processes such as caustic soda production.





For fast flow rates—Celite 545 has a higher proportion of coarse particles. Frequently used for clarification of resins and other viscous liquids.





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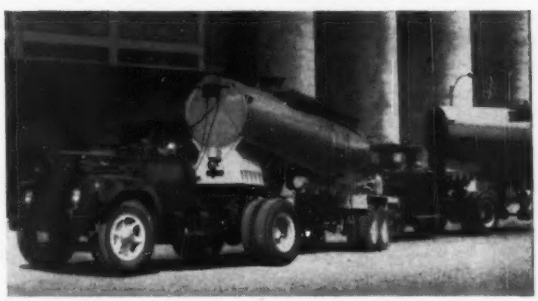

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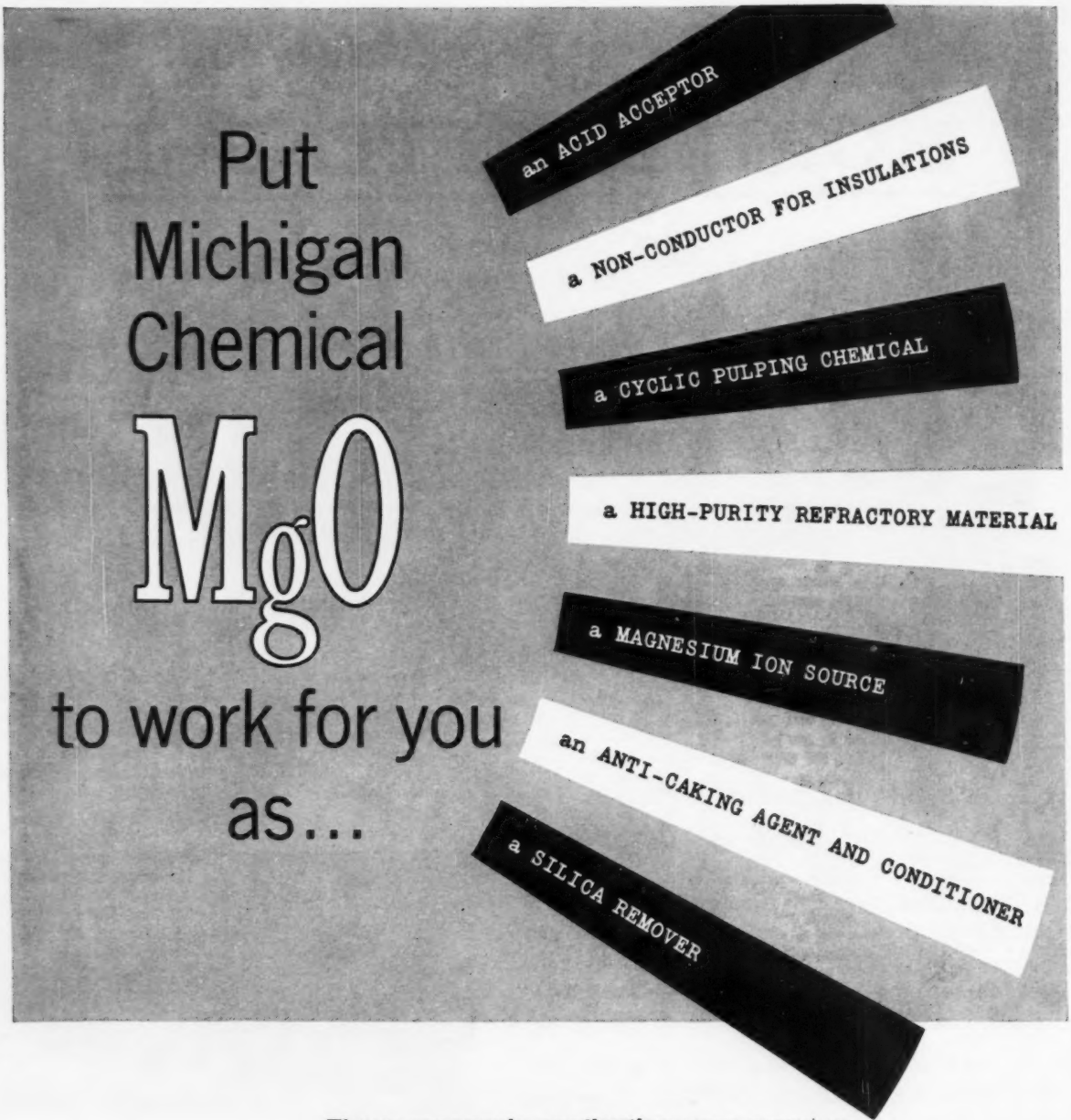

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WIDE WORLD
Scientist Bronk, lawyer Kendall head probes into FDA dealings.

Keeping Heat on Drug Firms

New relationships between pharmaceutical companies and the federal government — likely to stem from political developments now in the making—are demanding and getting intensive study from the industry's top leaders this week.

Whatever new policies are in gestation during this campaign season are not expected to disrupt the long-term growth of the U.S. pharmaceutical industry.

But last week's primary election triumph for Senator Estes Kefauver (D., Tenn.)—the man who has done more than anyone else to build up pressure for changing the existing government-industry relationships — assures that drug prices, patents and profits will continue to be in the public eye from now until well into the 1961 session of Congress.

More Hearings Planned: Inasmuch as Kefauver—in stumping his state last month—stressed his role as chief gadfly of the pharmaceutical industry, he is expected to regard his renomination (which is virtually as good as election) as a mandate to continue that investigation. So all persons concerned are counting on Kefauver to reconvene his Senate antitrust subcommittee sometime this fall to delve further into matters concerning antibiotics and the role of the government in prescription drugs.

Next, it's reasonable to assume that Kefauver will be eager to learn about the findings of two special committees—one headed by scientist Detlev Bronk, the other by attorney Charles W. Kendall—looking into the Food and Drug Administration and its staff, and their relations with pharmaceutical producers. Kefauver's investigation was largely responsible for the establishment of these two committees, and — depending on their findings—he might see a chance for making further political capital by publicizing their reports and by calling for new remedial measures.

Similarly, Washington looks for Kefauver to keep an eye on two big legal proceedings that involve pharmaceutical companies, and to make whatever use he can of any rulings in those cases. One is the Federal Trade Commission's action against five principal producers and marketers of tetracycline antibiotics, in which Hearing Examiner Robert Piper may make his decision by the end of this year. The other is the Justice Dept.'s antitrust case against two leading companies in the meprobromate tranquilizer field; this case has not yet come to trial.

Legislation, Regulation: Furthermore, Kefauver's practically certain reelection and the probability that his party will retain control of the Senate make it an odds-on bet that the next Congress will pay plenty of attetion to legislative proposals anent the pharmaceutical industry.

Two such measures are in the Congressional hopper right now, but in all likelihood will hardly be mentioned during the special pre-election session that began this week. Outlook is, however, that these and other bills concerning drugs will be reintroduced when the 87th Congress convenes in January.

Meanwhile, FDA—largely in response to the testimony and charges aired in the Kefauver subcommittee hearings last spring—is proposing two new regulations on which pharmaceutical companies and their industry association are now preparing to take a stand. One of these proposed new rules would require more detailed information, including data on possible side-effects, to be shown on labels of prescription drugs shipped to pharmacies and physicians. The other would authorize an FDA inspector to enter a pharmaceutical manufacturing plant—with or without management's permission — to check on production methods.

Drugs in Campaign Issues: Of potentially decisive importance in shaping public policy on pharmaceuticals are two issues that may be principal bones of contention during the Presidential and Congressional election campaigning this fall. One is so-called "administered pricing," held by Kefauver and some liberal economists to be a major factor in the inflation of the past 10-15 years. The Democratic Presidential nominee, Senator John Kennedy, will probably speak out on this topic in a major address on economic policies later this month. The other is the

much disputed question of medical care for older citizens.

The old folks' "medicare" hassle appears sure to figure in the election, even if one of the pending proposals is enacted in the pre-election session of Congress—which now seems unlikely. And the cost and availability of ethical drugs needed in such a program will almost inevitably be discussed in the hustings. A federally-sponsored medicare program would presumably mean larger shipments of various pharmaceutical products, but industry leaders generally are opposed to such a program.

One opinion: Parke, Davis President Harry Loynd recently declared that the pharmaceutical industry and the medical profession can handle this problem themselves.

Weighing New Tactics: Facing these new political realities, pharmaceutical companies' managers are rethinking everything their firms have been doing. An industry study completed this week by specialists of the Empire Trust Co. (New York) suggests that changes are already on the way:

"All drug companies have been forced to re-examine their operating procedures, from manufacturing to pricing and promotion. The investigations will undoubtedly have some influence on the pricing of new drugs. This will cause a lengthening of research pay-outs, but in turn may be counterbalanced by a more concentrated, efficient effort to develop and commercialize new products. Promotion procedures will be closely scrutinized in the light of competition to get the most out of advertising dollars. Approval of new drug applications from the FDA will be more difficult and costly to obtain. In turn companies will make fewer proposals, but those that are made will be commercially complete."

And above all, the rise of "Kefauverism" is impelling drug companies to look to their public relations. The pharmaceutical industry is not running for election this fall, but it's anxiously appealing for support. This greatly increased concern about public understanding may in itself lead to new operating policies —but it's anybody's guess as to whether changes voluntarily adopted by these companies would satisfy Kefauver.

Countering the Downtrend

General erosion of earnings is a dominant theme in midyear financial data issued last week by late-reporting companies. But several chemical producers managed to counter this trend.

Canadian Industries Ltd.—whose net income rose relatively slowly over the past two years—shows a 27% gain in first-half earnings, "mainly as a result of the 16% increase in volume." CIL President Peter Allen adds that exports of polyester fiber and polyethylene were much higher than in first-half '59, although competition in world markets for polyethylene "is severe and increasing."

Cosden Petroleum—now a 53%-owned subsidiary of W. R. Grace & Co.—held back on its petroleum refining operations because of "the present economic recession in the petroleum industry," but significantly boosted earnings by expanding its petrochemical operations. Cosden President R. L. Tollett says 18% of after-depreciation gross profit from refining and marketing in the past fiscal year was realized on production and sale of polybutene, styrene, polystyrene, benzene, toluene and xylenes.

Lower profitability of defense contracting, as compared with commercial operations, shows up strong in the contrasting performances of Food Machinery and Thiokol Chemical. Thiokol achieved an overall sales increase, but this involved a large increase in rocket business for the government and a 27% drop in chemical sales. Result: a sharp fall-off in profits.

FMC, on the other hand, weighed in with a slightly lower sales total and an encouraging rise in earnings. Explanation: while sales of defense products was down by nearly 35%, six-month chemical sales rose by 9%, to $87.9 million.

Three of the companies with first-half setbacks are banking on new plant projects for future upturns. Carwin expects to start up its isocyanates plant in Texas during the fourth quarter of this year; Michigan Chemical is expanding its bromine plant in Arkansas and its magnesia plant in Florida; and Pennsalt has completed a $6-million modernization program at its Michigan chlorine-caustic plant.

COMPANIES	SALES 1st half 1960 *	SALES Change from 1st half '59	EARNINGS 1st half 1960 *	EARNINGS Change from 1st half '59
Aluminum Co. of Amer.	$443.0	Up 4.3%	$21.7	Down 24.9%
Amer. Metal Climax	353.4	Up 11.2%	19.8	Up 35.7%
Anken Chem. & Film	3.4	Up 53.4%	0.4	Up 76.6%
Atlas Powder	35.5	Up 1.6%	1.8	Down 15.6%
Canadian Industries	91.5	Up 16.4%	4.5	Up 27.0%
Carwin Co.	1.6	Up 3.0%	0.03	Down 38.1%
Catalin Corp.	10.0	Down 10.9%	(—0.05)(1)	—
Celanese Corp.	137.5	Up 7.7%	10.0	Down 3.7%
Chemetron	68.1	Up 5.7%	2.5	Up 37.8%(6)
Columbian Carbon	41.4	Up 12.9%	4.0	Up 15.5%
Columbia Cellulose	14.8	—(2)	1.8	—(2)
Cosden Petroleum(3)	83.3	Up 0.3%	4.8	Up 5.4%
Du Pont	1,097.1	Up 2.7%	136.0(7)	Down 10.3%
Food Mach. and Chem.	180.8	Down 1.8%	12.1	Up 5.3%
Gen. Aniline & Film	80.6	Up 5.0%	3.6	Up 1.4%
Harshaw Chemical(5)	55.5	Up 6.6%	1.2(6)	Down 15.6%(6)
Int. Minerals & Chem.(8)	123.9	Up 10.0%	7.5	Up 20.8%
Michigan Chemical	3.9	Down 15.8%(4)	(—0.1)(1)	—
Nalco Chemical	25.5	Up 4.5%	2.4	Up 11.0%
Olin Mathieson Chem.	348.3	Up 0.3%	18.7	Up 6.6%
Pennsalt Chemicals	47.1	Up 3.9%	2.7	Down 3.8%
Pierce & Stevens Chem.	4.5	Up 7.8%	0.3	Down 0.5%
Reheis Co.	1.3	Up 21.2%	0.1	Up 12.6%
Southern Nitrogen	7.1	Up 22.1%	1.4	Up 30.6%
Staley (A. E.) Mfg.	114.0	Down 9.0%	3.2	Down 26.8%
Sterling Drug	110.7	Up 7.5%	10.5	Up 10.0%
Thiokol Chemical	83.4	Up 3.2%	1.7	Down 39.4%
U.S. Borax & Chemical(5)	51.2	Up 8.2%	5.4	Up 15.4%

* All dollar figures in millions. (1) Net loss. (2) Comparable data for first-half '59 not available. (3) For fiscal year ended April 30. (4) First-half '59 sales included relatively large shipments under government contract that expired in June '59. (5) For nine months ended June 30. (6) Excluding capital gains on sales of securities. (7) Net operating income; excludes dividends on General Motors stocks and other income from non-consolidated companies. (8) For fiscal year ended June 30.

One More for Witco

With a little luck, Witco Chemical (New York) may climb into the $100-million/year sales bracket this year. The company took a big stride toward that goal last week by acquiring Sonneborn Chemical and Refining Corp. (New York) and its subsidiaries.

Sonneborn — founded in 1903 — during the fiscal year ended Jan. 31 netted $858,000 on sales of $37.5 million. With plants at Petrolia and Franklin, Pa., and Belleville, N.J., Sonneborn produces white oils, solvents, lubricating oils, petroleum sulfonates, petrolatums, micro-crystalline waxes and other petroleum-derived specialties. As a Witco subsidiary, Sonneborn will continue to operate independently.

Witco—organized in '20—earned $1.2 million during the first six months of this year on sales of nearly $30.8 million. With improving operation of the phthalic anhydride plant at Chicago and other new facilities completed last year, plus startup of a $1.6-million detergent plant at Chicago late this year and the Sonneborn revenue added, Witco stands a chance of crossing the $100-million sales mark this year. If not, '61 would appear to be a safe bet for that achievement, with an East Coast phthalic anhydride plant and a West Coast alkylbenzene plant both slated for startup that year.

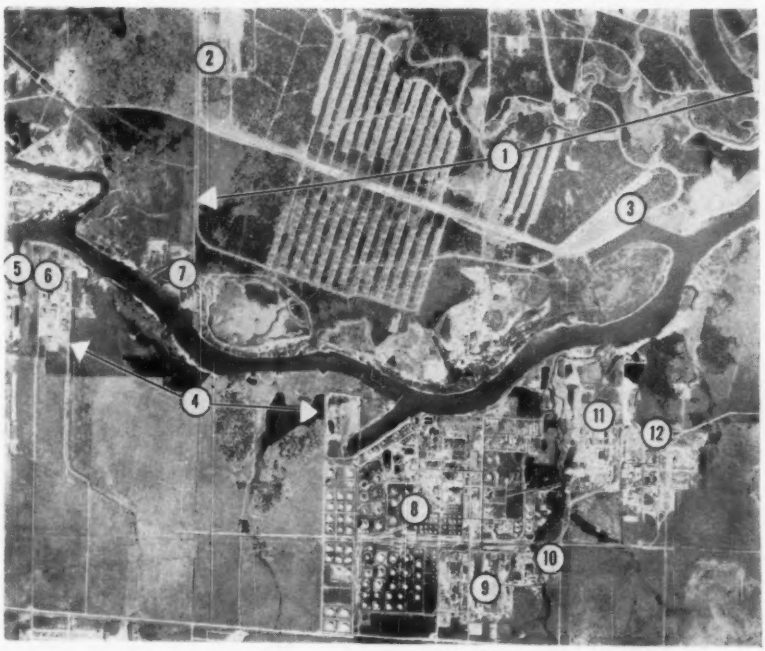
Acquisition of Sonneborn—Witco's fourth acquisition within two years —was carried out by issuing 300,000 new shares of Witco common stock (quoted at $38-41/share over-the-counter during the previous week) for all outstanding Sonneborn stock.

Resins and Recorders

Management at Minnesota Mining & Mfg. last week decided to add Kel-F halofluorocarbon facilities to the company's chemical plant under construction at Decatur, Ala. The decision nips in the bud any impression that 3M's Chemical Products Division was being overlooked in the company's expansion and diversification program.

The Decatur expansion (*CW Business Newsletter, Aug. 6*) follows 3M's purchase of Revere Camera Co. (Chicago) and a Revere subsidiary, Wollensak Optical Co. (Rochester, N.Y.). Revere and Wollensak chiefly produce movie cameras, projectors, recorders, photographic lenses and industrial cameras; but 3M's interest centered on Revere's line of tape cartridge players.

The Minnesota company has developed a tape cartridge system of recorded music for the home, and is offering this system to the music recording industry through licenses on the various patented inventions involved. President Herbert Buetow says 3M management felt that to maximize the return on its "very substantial" research investment, the company should also produce tape cartridge players; and by purchasing Revere, "we acquire these resources immediately."



No Rush to Buy Texas Plant Sites

Chemical companies—with one exception—sat out last week's bidding on the 4,500-acre San Jacinto Ordnance Depot **(1),** sprawled along the north side of the Houston Ship Channel in Harris county, Tex.

The lone exception: Smith-Douglass Corp., which offered $2.6 million for the 91-acre tract **(2)** containing the 110-tons/day ammonia plant this company operates under a lease that runs to '74.

One other bidder with chemical industry development in mind: David Bintliff, Houston financier, who offered nearly $1.5 million for a 232-acre tract **(3)** that includes a 1,500-ft. concrete wharf, warehouses, and a 34-ft. deep slip. Bintliff says the property "has a great potential for development of a large chemical industry complex" and for importing bauxite, sulfates, and other dry bulk ores.

The Houston Port Commission — which of course is eager to bring more industries of all kinds into its district—bid $8 million for all of the 41 tracts into which the depot land was divided for bidding purposes.

Aside from the ordnance depot and the 794-acre south-side tract **(4)** purchased about one year ago by Tennessee Gas Transmission, nearly all land suitable for industrial development on either side of the channel is already taken. In addition to the ammonia plant, other CPI plants shown in this aerial map are Phillips Chemical **(5),** Ethyl Corp. **(6),** Ideal Cement **(7),** Shell Oil **(8),** Shell Chemical **(9),** Lubrizol **(10),** Diamond Alkali **(11),** and Rohm & Haas **(12).**

It's expected that General Services Administration will decide within a week whether to accept any of the bids on the depot tracts.

COMPANIES

McKesson & Robbins (New York) is seeking registration with the Securities and Exchange Commission of $15 million worth of debentures due '80 to be offered for public sale through underwriters headed by Goldman, Sachs & Co. (New York). Part of the proceeds will finance acquisition (at an estimated cost of $3.5 million) of a 50% interest in the drug and cosmetic toiletries business of the South American firm, Droguerlas Aliadas, S.A. (*CW, Aug. 6, p. 24*). Also, $6 million will be used to retire several short-term loans. Remainder of the funds is slated for general corporate purposes.

•

Amcel Propulsion Inc.—the subsidiary of Celanese Corp. organized last year for research, development and production in a comprehensive rockets and missiles program—is establishing a Washington, D. C., office for technical liason with contractors and government agencies. Daniel E. Keller, Jr., formerly with U.S. Air Force Research and Development Command, has been assigned to the area as marketing representative.

•

Vick Chemical Co. (New York) will submit for stockholder approval in October a four-for-three stock split. Also sought: stockholder approval of an increase in authorized stock to 8 million shares, to provide stock for future acquisitions. If the split becomes effective, management plans to establish a 25¢/share quarterly dividend rate, equivalent to a one-third increase in the present rate.

•

Western Kraft Corp. (Portland, Ore.) has taken over operation of two paper mills and three corrugated container plants in California on 10-year leases with option to buy. They are: Kalof Pulp & Paper mill and Cadillac Container box plant, both at Port Hueneme; the paper mill and box plant of Quaker Container Corp. (Richmond), and Quaker's corrugated container plant at Vernon.

•

Wyandotte Chemicals (Wyandotte, Mich.) has negotiated the purchase of all 124,568 outstanding shares of its 4% preferred stock, which has been held by North American Solvay Inc. (New York). Wyandotte will buy the $100-par shares for a total of $11,086,552, of which $7.5 million will come from a bank loan and the remainder from working capital.

EXPANSION

Kraft, Liner Board: Dixie Land and Timber Co. (Atlanta, Ga.) has selected a 350-acre site south of Phenix City, Ala., for construction of a $30-million kraft and liner-board plant. Preliminary engineering is underway, with construction set for February. The facility is expected to be in operation early in '62.

Carbon Black: Columbian Carbon (Canada) Ltd. will build a $5-million carbon black plant near Hamilton, Ont. More than 20 acres of land for the unit were purchased from the city for $250,000. Columbian plans an "immediate" start on construction. Production goal: Aug. '61.

•

Cleaning Products: Wyandotte Chemicals (Wyandotte, Mich.) will build a plant to manufacture its complete line of J. B. Ford cleaning products in Toronto, Canada. This will be Wyandotte's first manufacturing plant there; it has sales and service representatives located throughout Canada. Costs were not disclosed but construction is expected to begin late this year.

•

Beryllium: Brush Beryllium Corp. (Cleveland) has opened its first fabrication plant on the West Coast at Hayward, Calif. And the company plans to relocate and expand its beryllium rolling plant at the Brush Pennrold Division (Reading, Pa.) The new rolling plant —which will double capacity for wrought products from beryllium copper and other alloys—is now under construction at Shoemakersville, Pa.

FOREIGN

Citric Acid, Pigments/India: A group of Bombay businessmen is trying to raise $1 million for a 1,500-tons/year citric acid plant near Bombay. Technical know how would come from West Germany. Also, La Porte Industries of the United Kingdom plans an interest in a newly projected company, Potanium Ltd., which is slated to build a $6.3-million titanium dioxide plant on the west coast. Planned capacity of this plant: 4,500 tons/year.

•

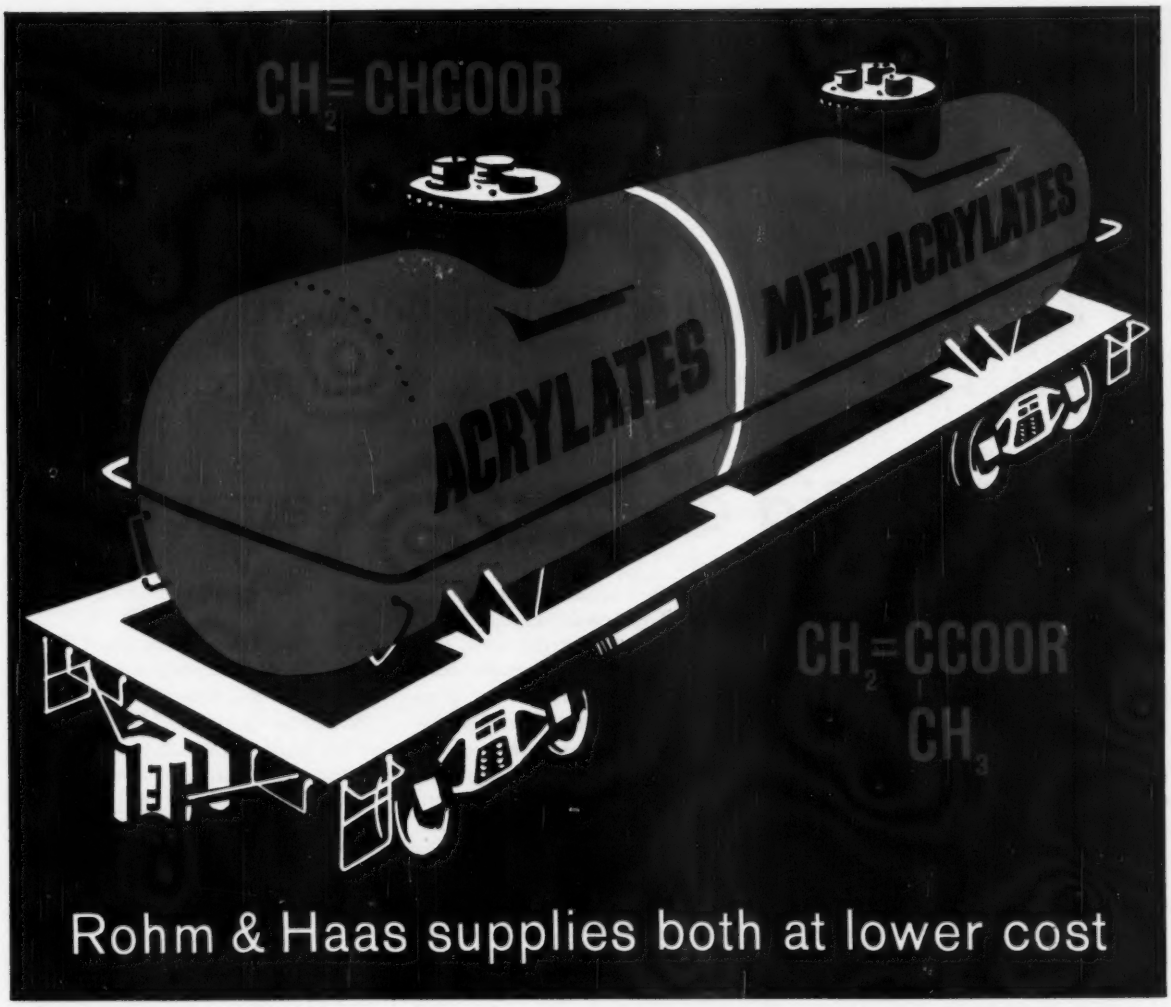
Polyolefins/England: The Shell Group in London will make its first move into the finished plastics field. It is setting up a company, still unnamed, to be jointly owned by Shell and the U.S. concern, National Distillers and Chemical Corp., to produce polyolefin packaging materials. Headquarters of the new firm will be in London.

•

Chemicals/Holland: Pennsalt Chemicals Corp. (Philadelphia) has acquired a substantial interest in N. V. Fabriek van Chemische Producten of Vondelingenplaat near Rotterdam. Expansion plans call for an immediate start on construction of a $2-million unit

•

Nylon/England: Imperial Chemical Industries Ltd. will spend $28 million for expansion of nylon yarn facilities at Wilton to 15,000 tons/year. Aim: production of heavier denier yarns for tire cord applications, to produce tertiary dodocylmercaptan and other organic sulfur compounds at the Vondelingenplaat site. In '61, Pennsalt will introduce Vondelingenplaat's pesticide line in the U.S., Mexico and Canada.



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Brazil's 'impossible' chemical boom roars on, fueled by U.S. and European investment capital

U.S. Bets Big on Brazil Chemicals

When U.S. chemical industry management men discuss business opportunities in Latin America, they usually talk first about Brazil—the biggest, fastest-growing, and one of the steadiest countries below the Rio Grande.

Geographically, Brazilians like to point out, their country is bigger than the U.S. (if you leave out Alaska), sprawls over almost half of South America, and possesses a treasure chest of largely untapped mineral wealth. Economically, Brazil's gross national product is swelling by more than 5%/year—roughly twice the growth rate of the U.S. GNP—and it's already the largest in Latin America.

The chemical industry is expanding twice as fast as the economy as a whole.

Foreign investors have provided much of the fuel for this growth. Most of the overseas capital has come from the U.S. Direct investments by U.S. companies total about $1.5 billion—almost half has gone into manufacturing, but a substantial share is invested in pharmaceuticals and chemicals.

Last year, Brazil's chemical industry turned out products valued at 20.5 billion cruzeiros—about $111 million at the free market exchange rate. And to fill the balance of its chemical needs, Brazil imported chemical products valued at $102.3 million. The U.S. supplied about 40% of this. Fastest growing sector of Brazil's chemical industry: plastics. Between '57 and '59, resin output increased from 31,090 to 48,735 metric tons, and production of polyethylene, vinyl acetate monomer and nylon molding powder started.

In the Works: Right now several affiliates of U.S. companies have expansions in the works, or are planning projects. Diamond Alkali is contemplating a joint venture with the Brazilian company, SIPES, for a $7-10 million project to produce chlorinated products. Borden's Alba S.A. has slated new investments for the production of color printing inks and disinfectants.

And Union Carbide, which is associated in about a dozen Brazilian ventures, has several more on the way. With Toscany, Inc., New York producer of polyvinyl chloride films, Carbide has an interest in Vulcan Material Plastico, which turned out 4,351 tons of plastic sheet, film, and foam last year. Vulcan plans a 35% capacity boost by next February, also now eyes a joint venture with France's Saint-Gobain to produce plastic-softening agents. Another Carbide subsidiary, White Martins, is starting production of liquid oxygen and nitrogen. Koppers and Reichhold affiliates are also expanding.

No Clear Field: U.S. interests, however, are running into more and more competition from European companies. Cia. Franco Brasileira de Anilinas, reportedly controlled by France's Kuhlmann, has launched a plant to produce fast dyes. Bayer's local subsidiary is building a second sulfuric acid plant to boost production to 100,000 tons/year, is also reported ready to produce aniline dyes. Bakol, an affiliate of Germany's Huels, and Petroclor, a subsidiary of Belgium's Solvay, both plan to make polyethylene.

Another German company, BASF Handels und Export, has furnished $2.1 million in equipment to Cia. de Productos Quimicos Idrongal for a plant in Rio to make sodium hydrosulfite, zinc oxide, and other products. France's Progil will join Cia. Electroquimica Fluminense to build a pentachlorophenol and sodium pentachlorophenate plant in Niteroi. And the three big Swiss producers—Ciba, Geigy and Sandoz — have formed Quimica Resende and are building a big dye plant midway between Rio and São Paulo.

Food for Expansion: Brazil's increasing refinery output is boosting availability of raw materials, which, in turn, is expected to trigger expansions by petrochemical makers. But some of them may be greatly disappointed.

Right now, Brazil refines about 175,000 bbls./day of petroleum products—about half its present consumption. All but some 45,000 bbls. of this comes from the refineries of the government-controlled petroleum monopoly, Petroleo Brasileiro (Petrobras). The other 45,000 bbls. comes from small private refineries that were in operation before the '53 petroleum regulations, established Petrobras as a monopoly. Private refineries are not permitted to expand.

Petrobras is expanding capacity by 155,000 bbls./day. The big question is how much of the resulting petrochemical expansion will be left to private industry. Besides its monopoly on prospecting, production, and

Profile: Brazil's Chemical Industry

Company	Foreign Affiliate	Products
Cia. Aga Paulista de Gas Acumulado	Svenska Aktiebolaget	Oxygen, hydrogen, nitrogen, acetylene
Agro-Industria Amalia		Citric acid
Alba S.A. Adesivos e Lacticinios	Borden	Methanol, acetaldehyde
Analinas e Productos Quimicos		Sodium phosphate
Bakol S.A.	Chemische Werke Huels	Polyethylene
Bayer de Brasil	Farbenfabriken Bayer	Sulfuric acid, coal-tar dyes, bichromates, inorganic pigments, chromic acid, hydrochloric acid.
Cia. Brasileira de Aluminio		Sulfuric acid, aluminum sulfate
Cia. Brasileira de Estireno	Koppers, Firestone	Styrene
Colombina Ltda.		Sulfuric acid
Condoroil Tintas		Inorganic pigments
Dupont do Brazil	Du Pont	Sulfuric acid, nitric acid, hydrofluoric acid
Cia. Eletroquimica Paulista		Potassium chlorate
Eletro Quimica Brasileira		Sulfuric acid
Cia. Eletro Fluminense	Pluss-Staufer (Switzerland)	Caustic soda, chlorine, hydrochloric acid
Cia. Eletro Quimica de Osasco	Oronzio de Nora Impiante Elettrochimici (Italy)	Hydrogen peroxide
Eletro Quimica Pan Americana		Caustic soda, chlorine, hydrochloric acid , sodium sulfide
Estabelecimento Nacional Industria de Analinas		Coal-tar dyes
Fabrica Presidente Vargas (War Ministry)		Ether, sulfuric acid, nitric acid, hydrochloric acid
Fongra Produtos Quimicos	Farbwerke Hoechst	Acetone, butyl alcohol, caustic, chlorine
Cia. Franco-Brasileira de Anilinas	Kuhlmann (France)	Coal-tar dyes
Geon do Brasil	B. F. Goodrich	Polyvinyl chloride
IASA Industrias Quimicas Metalurgicas		Copper sulfate
Industria Andrade Latorre Ltda.		Potassium chlorate
Industria Brasileira de Pigmentos	C. Tennant & Sons of N.Y.	Inorganic pigments
Cia. Industrias Eletro Quimica		Copper sulfate
Industrias Klabin do Parana		Caustic soda, chlorine
Industrias Quimicas Bento Goncalves		Copper sulfate
Industria Quimica Eletro Cloro	Solvay et Cie., Imperial Chemical Industries	Caustic soda, chlorine, hydrochloric acid, polyvinyl chloride
Industria Quimica Mantiqueira		Hydrogen peroxide, oxalic acid
Industria Quimica Produtos Ftalicos	W. R. Grace	Phthalic anhydride, other basic organics
Industrias Reunidas F. Matarazzo		Ether, sodium bisulfate, hydrochloric acid, aluminum sulfate, sodium bisulfate, sulfuric acid, caustic, chlorine
Industrias Votorantim		Sulfuric acid, lime
Ipiranga S.A. Cia. Brasileira de Petroleos		Sulfuric acid
Liquid Carbonic Ind.	Liquid Carbonic	Carbon dioxide gas
Cia. Nacional de Alcalis		Caustic soda, chlorine (see text)
Cia. Nitroquimica Brasileira		Caustic soda, chlorine, sulfuric acid, hydrochloric acid, potassium chlorate, sodium sulfide, aluminum sulfate, sodium bisulfate, ether
Cia. Nitroquimica Fluminense		Nitric acid
Orquimica Industrias		Sodium phosphates
Oxigenio do Brasil	Societe L'Air Liquide	Oxygen, nitrogen, acetylene, argon
Petroclor Industrias Quimicas	Solvay et Cie	Polyethylene
Petroleo Brasileiro (Petrobras)		Nitric acid, ammonia, calcium nitrate, ammonium nitrate, cracked tar, hexane, rubber solvents, turpentine, LPG, ethylene
Cia. Petroquimica Brasileira	Columbian Carbon, Celanese	Carbon black, hydrofluoric acid
Produtos Quimicos Elekeiroz		Ether, phthalic anhydride, aluminum sulfate, copper sulfate, bichromates, hydrochloric acid, sulfuric acid
Quimbrasil		Inorganic pigments
Quimbrasil-Quimica Industrial Brasileira	Bunge & Borne	Sulfuric acid
Quimica Basica	Montecatini	Caustic, chlorine
Cia. Quimica Industrial CIL		Sulfuric acid, inorganic pigments
Quimicas Reunidas		Sodium phosphate
Cia. Quimica Rhodia Brasileira	Rhone-Poulenc	Ammonia, hydrochloric acid, sulfuric acid, ether, acetone, ethyl acetate, sodium acetate, vinyl acetate , amyl alcohol, acetic acid
Resana	Reichhold	Synthetic resins
Cia. Siderurgica Nacional		Solvent naptha, crude naphthalene, anthracene oil, creosote oil, toluol, xylol, benzol, lime, ammonium sulfate
Cia. de Superfosfatos e Produtos Quimicos	Kuhlmann	Sulfuric acid
Union Carbide de Brasil	Union Carbide	Polyethylene
Usinas Sao Cristovao de Tintas		Inorganic pigments
Usina Victor Sense		Butyl alcohol, acetone, butyl acetate, amyl acetate
White Martins	Union Carbide	Nitrogen, hydrogen, oxygen, acetylene, argon
Zambotto Industria de Analinas e Produtos Quimicos		Sodium phosphate
Zapparoli Serena		Copper sulfate

State Petroleum czar Sardenberg: His petrochemical ambitions worry chemical makers.

refining of petroleum, Petrobras has the power to block private petrochemical ventures in favor of its own.

Take the case of Union Carbide, which has been wanting to expand polyethylene production. To win approval from the National Petroleum Council, Carbide had to show a contract from Petrobras to supply the ethane. But Petrobras refused to sign a contract, claiming that there is not enough ethane to go around, and that it plans to make polyethylene itself. By law the Petroleum Council must give preference to companies with the greatest percent of Brazilian ownership, when allocating raw materials. So it had to turn thumbs down—for the time being, at least—on Carbide's project.

Petrobras' president, Gen. Idalio Sardenberg, insists he sees Petrobras' role as supplying the petrochemical industry with raw materials. But private industry men are skeptical that the state monopoly will limit its role to raw materials producer. Sardenberg, for example, wants Petrobras to produce synthetic rubber, so he has made synthetic rubber an exception to his rule; Petrobras is putting up a 40,000-tons/year GRS plant.

And Petrobras plans an ammonia fertilizer plant, to use Mataripe residual gases or oil distillates as raw materials, and a 4,500 tons/year tetraethyl lead plant, calculated to save Brazil $3.8 million in foreign exchange.

Government in Industry: Petrobras' spreading empire is not the extent of government activity in chemicals. Last month, the big government-controlled Cia. Nacional de Alcalis plant at Cabo Frio started operations. Using nearby calcium deposits and salt from seaside evaporation tanks, the plant will turn out 120,000 tons/year of soda ash, 8,000 tons of magnesium oxide, 22,000 tons of gypsum, and 27,000 tons of calcium carbonate. Still to be installed is the plant's $1.1-million caustic soda unit, which will produce 20,000 tons/year.

The federal government is also in the chemical industry through the War Ministry's explosives plant, and the monazite sands processing plant which was purchased by Brazil's Nuclear Energy Commission.

These projects don't amount to very much in Brazil's total chemical industry. And aside from the still unknown extent of Petrobras' ambitions (which will have powerful political backing, however they turn out), government activity in the chemical industry, or manufacturing in general, will probably remain small. Actually, if they could get away with it politically, many in government would be willing to sell the Alcalis plant. A hangover from more nationalistic days, it has taken 20 years to build and has soaked up a staggering $26 million.

Foreign investors are sometimes alarmed by occasional outbreaks of nationalism. Recent instances: last year's expropriation of a local subsidiary of American & Foreign Power Co. by the state of Rio Grande do Sul; a bill introduced in the Chamber of Deputies, which would have restricted repatriation of profits to foreign firms. But these are isolated cases stemming from politicians' appeals to popular nationalistic sentiments, which are strong throughout Latin America. Observers note a surprising lack of anti-U.S. nationalistic appeals in the current campaign for this October's presidential elections.

Bid for Investors: Brazil's President Juscelino Kubitschek recognizes that private foreign investments will be necessary to help him fulfill his promise that Brazil will "enjoy in five years the progress of 50." Because of Brazil's unfavorable balance of trade and its staggering foreign exchange problem, almost all imported capital goods must be financed by suppliers.

Since the country is already over its head in foreign debt, equipment must come in primarily in the form of direct investments. Kubitschek has successfully promoted such direct investment by his "Instruction 113" of '55, which allows new plant equipment purchases through the free market without exchange cover and premium payments.

Moreover, there are no limits on percent of foreign ownership in most manufacturing areas, or on remittance of profits or capital. And companies don't have to bargain with the powerful unions; they deal with the government. The latter has been generous in granting pay raises, which the companies simply pass on to their customers. Despite high raw-material costs, the need for large inventories (because of supply uncertainties), and whopping interest rates (up to 24%/-year), profits of 25-50% of invested capital aren't unusual.

Riding for a Fall? By orthodox economic gospel, Brazil's incredible economic boom is "impossible." Because of heavy government deficit spending, lavish wage increases, a complicated system of multiple exchange rates, and subsidies on fuel and wheat, inflation is rampant. From 100 in '48, the cost of living index soared to 548 in May of '59, and hit 725 12 months later. Unless there is a radical change in government policy, inflation will continue to rocket.

This hasn't helped alleviate Brazil's trade problems. Despite efforts to diversify exports, coffee and cocoa still provide 65-75% of Brazil's foreign exchange, which is far short of the country's needs. Most of this is eaten up by imports of oil, wheat, newsprint, and repayment of the country's massive foreign debts. Reflecting Brazil's shaky foreign exchange position, the value of the cruzeiro on the free market slid from 0.743¢ in June '59 to 0.536¢ in June '60.

Brazil has been able to maintain its import levels by a combination of hard bargaining and luck. Late last year an unexpected rise in coffee ex-

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Celanese CHEMICALS

Brazil's Chemical Imports–1958

	Millions of dollars	Million lbs.
Chemicals and related products	**131.6**	
Inorganic chemicals	**27.4**	
Organic chemicals	**28.7**	
Pharmaceutical and medicinal preparations	**16.0**	
Tanning extracts	**9.0**	
Synthetic aromatic products and concentrates	**0.3**	
Detergents, emulsifiers, scouring agents	**1.1**	
Manufactured fertilizers	**25.7**	
Nitrogen	8.4	295.6
Phosphate	1.4	24.5
Potash	5.0	242.9
Synthetic plastics and resins	**6.0**	
Resins based on urea, phenol, amines, other condensation products	2.2	3.8
Polyethylene, polystyrene, polyvinyl chloride, other products of polymerization	2.2	6.5
Products from industrial chemicals	**16.6**	
Insecticides, fungicides, disinfectants (except medicinal)	**6.1**	

Selected Products

	Millions of dollars	Million lbs.		Millions of dollars	Million lbs.
Carbon black	**3.1**	**26.6**	**Methyl bromide**	**1.6**	**2.7**
Caustic soda	**8.1**	**19.4**	**Dioctyl phthalates**	**1.3**	**0.4**
Titanium oxides	**1.4**	**5.6**	**Ammonium sulfate**	**4.9**	**197.4**
Soda ash	**4.3**	**164.0**	**Urea**	**1.4**	**24.5**
Styrene monomer	**1.4**	**8.8**	**Freon**	**0.5**	**1.5**

ports cut the expected foreign exchange deficit in half. "Swap" deals—bartering coffee for commodities like oil, steel, and fertilizer—have also helped.

To make up its deficits and help service its debts, Brazil has depended to a great extent on loans from the U.S. and the International Monetary Fund. The U.S. has tried to pressure Brazil into "putting its economic house in order" by tightening up along the lines of the IMF's austerity program recommendations. Kubitschek has instituted some tightening measures—which have been largely ineffective—but refuses to really clamp down hard on the economy. He is worried about the political upheavals that could result from the short-term hardships involved, and he believes it would slow down Brazil's economic progress.

The U.S. finally compromised last year and refunded Brazil's short-term debts. But the IMF has remained adamant. Last month, it granted Brazil a $47.7-million loan—the most that Brazil can draw without having to make special arrangements, which would involve the painful economic clampdown. Critics note that this repayment is due in six months—after the elections—and assert it merely delays the day of reckoning.

Vote of Confidence: There seems to be more concern over Brazil's economic future in Washington than there is in Brasilia or in the board rooms of the U.S. companies that are pouring in more capital than ever before. A bust in the inflation-paced economy has been predicted for the past 15 years, and it hasn't happened yet. And Brazil's inflation hasn't been as bad as Argentina's, which has adopted the IMF austerity program. U.S. companies have avoided most of the sting of inflation by plowing their profits right back in.

Actually, there is a solid economic base under Brazil's current prosperity, and even U.S. government officials concede it can probably stand a good deal more inflation before "paying the piper." The population is the largest in Latin America—almost 65 million—and it's growing at the rate of about 2.6%/year—among the fastest in the world. Real economic growth, as previously noted, is increasing at better than 5%/year, and the big public investments in roads, power, steel and oil—though they are paid for with deficit financing—mean new jobs and markets, and less reliance on imports.

The construction of Brazil's new capital, Brasilia—the fabulous $350-million "city in the wilderness—is an example of Kubitschek's daring economic thinking. Roads will fan across the length and breadth of the country, opening virgin wilderness, and, Kubitschek hopes, drawing some of Brazil's crowded city population and immigrants to develop new farm land. And it will help make Brazil's largely untapped mineral wealth accessible to the country's fast-growing chemical industries.

INTRODUCING

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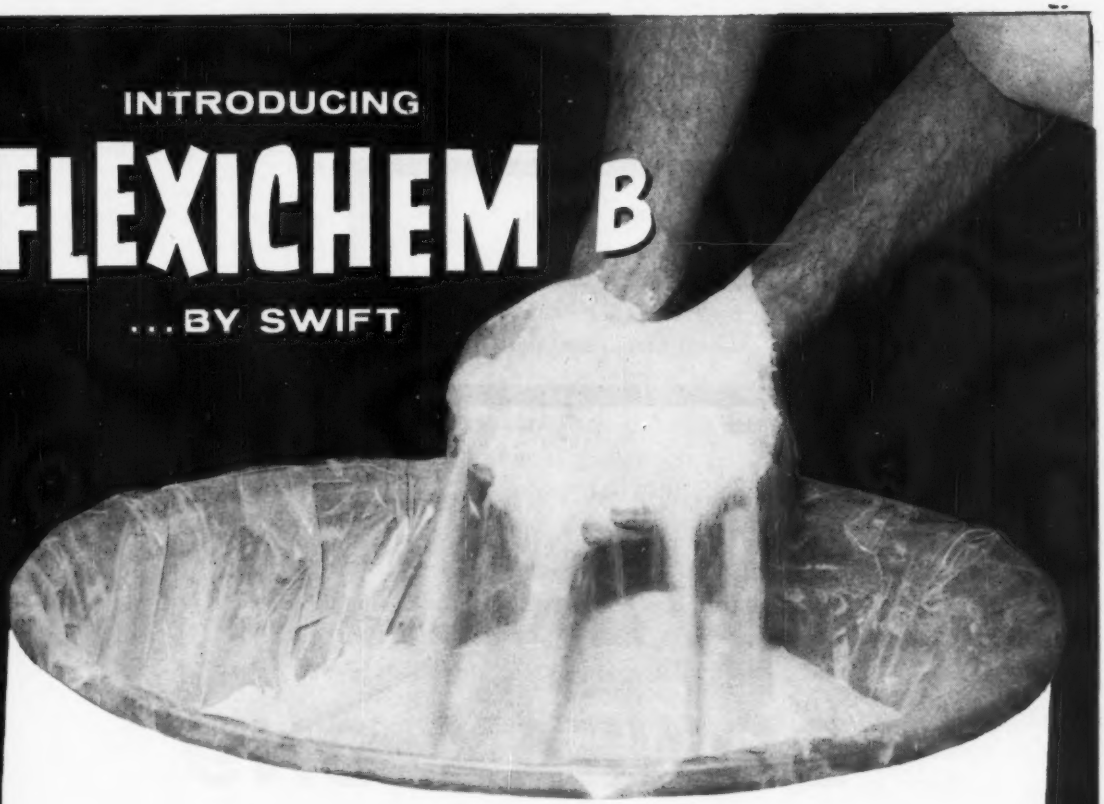
...BY SWIFT



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Color:	White
Odor:	Bland
Bulk density:	27 lbs. per cu. ft.
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Iodine number:	2 maximum
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Free fatty acid:	1.0%
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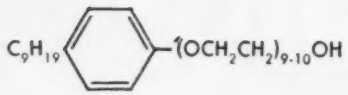

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THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Washington
Newsletter

CHEMICAL WEEK
August 13, 1960

Chemical industry experts got a line on space business for the next 10 years as they joined some 1,300 other industry representatives recently for a briefing by National Aeronautics and Space Administration officials. At stake is some $12-15 billion worth of government business, including a solid chunk for rocket fuels.

Company officials took copious notes on what NASA will buy to make 260 space shots over the next decade. The missions break down like this: 62 launchings for development of such vehicles as Scout and Saturn; 41 relating to manned space flight; 96 for scientific satellites; 33 for lunar and planetary scientific missions; and 28 for satellite applications.

Later this year a passive reflector satellite for communications will go up and attempts will be made to put a man into suborbital flight. And first launchings will be made of Scout, Delta, and Atlas-Able rockets. Next year, hopefully, comes the first manned space flight.

This year the space agency budget was $915 million. Annual expenditures will climb to about $1.5 billion in the next year or so, with 75% of it going to industry, universities and nonprofit organizations.

•

Increase of defense outlays in fiscal '62 will not exceed 3%, whoever is President, say budget experts. They consider a boost of $1.2 billion the practical limit because next year's outgo of defense money will be substantially tied to policy decisions made and contracts placed by the Eisenhower Administration.

The economic impact can be heavier than the dollar figure warrants, however. The impact of new defense orders, although they will not be paid for until later, would have a stimulating psychological effect.

Meanwhile the rate of military contract-letting is higher than usual for this time of year. For one thing, Congress approved the defense appropriation about a month earlier than usual this year. And the Administration has speeded up procedures for getting the contracts out—an election-year phenomenon well understood by old hands at the Pentagon. Estimates show an increase of $200 million, to a total of $6 billion in new orders, for the July-September quarter.

As for supplemental budget boosts for the military in the August session of Congress, there will be more jockeying for publicity than action. Sen. Lyndon Johnson has already started it—asking Defense Secy. Gates to say whether he would actually spend extra money if Congress voted it.

•

Wage boosts in the rubber industry may set the pattern for other industries this fall—notably oil, electricity and coal. Rubber workers got a 9.5¢/hour wage boost at Goodrich, Firestone and Goodyear. The average for all recent negotiations is 9¢.

Washington Newsletter

(Continued)

An important factor in all negotiations this year is the 2% rise in the Government's Consumer Price Index. Though automatic wage boosts tied to the index are being eliminated or toned down, unions still try to protect their pay packets to cover higher index figures when negotiations come up.

Oil, Chemical & Atomic Workers Union is demanding 18¢/-hour from oil companies (6¢ cost-of-living increase, 12¢ productivity); electrical unions are after a score of job security benefits as well as money; mining unions haven't defined their terms yet but are pointing to a government report showing a 10-12% productivity increase in '59 (*see also p. 67*).

•

National Institutes of Health should demand cut rates on all drugs purchased for clinical testing, says the Comptroller General. He points out that the drug developers benefit from NIH's experiments. Most drug companies do sell to NIH at cost or slightly above.

The government auditors' recommendations follow a study of NIH purchases of an experimental cancer drug, 5-fluorodeoxyuridine (5-FUDR) on which the supplier held an exclusive patent.

The investigators' report also criticized NIH for awarding fixed-price contracts of up to $450,000 for the chemical without provisions for adjusting prices if production costs proved less than estimated. NIH now has this implied authority, but the comptroller recommends that it be made clear by executive action.

•

The 30,000 previously secret technical reports on World War II research and development that will be made available through the Commerce Dept. within the next couple of months include technical data on such subjects as explosives and propellants, aerosols and gases, chemicals used for repellants, and chemical engineering problems.

A 700-page index of the reports will be available from the Office of Technical Services by September or October. The reports mainly will be available in microfilm form.

A 68-volume summary of the reports may be published. The Dept. of Defense is now making a survey to determine if demand for the summary volumes is sufficient to justify printing them.

•

First court test of federal authority in water-pollution cases is in the works, now that Health, Education & Welfare Secy. Arthur Flemming has formally asked the Justice Dept. to file suit against St. Joseph, Mo. City voters on May 21 defeated a bond issue that would have financed the required sewage treatment works. If a court orders the city to comply, the city council would have to find a way of financing the project out of general revenues or a special sewer tax, or be found guilty of contempt.

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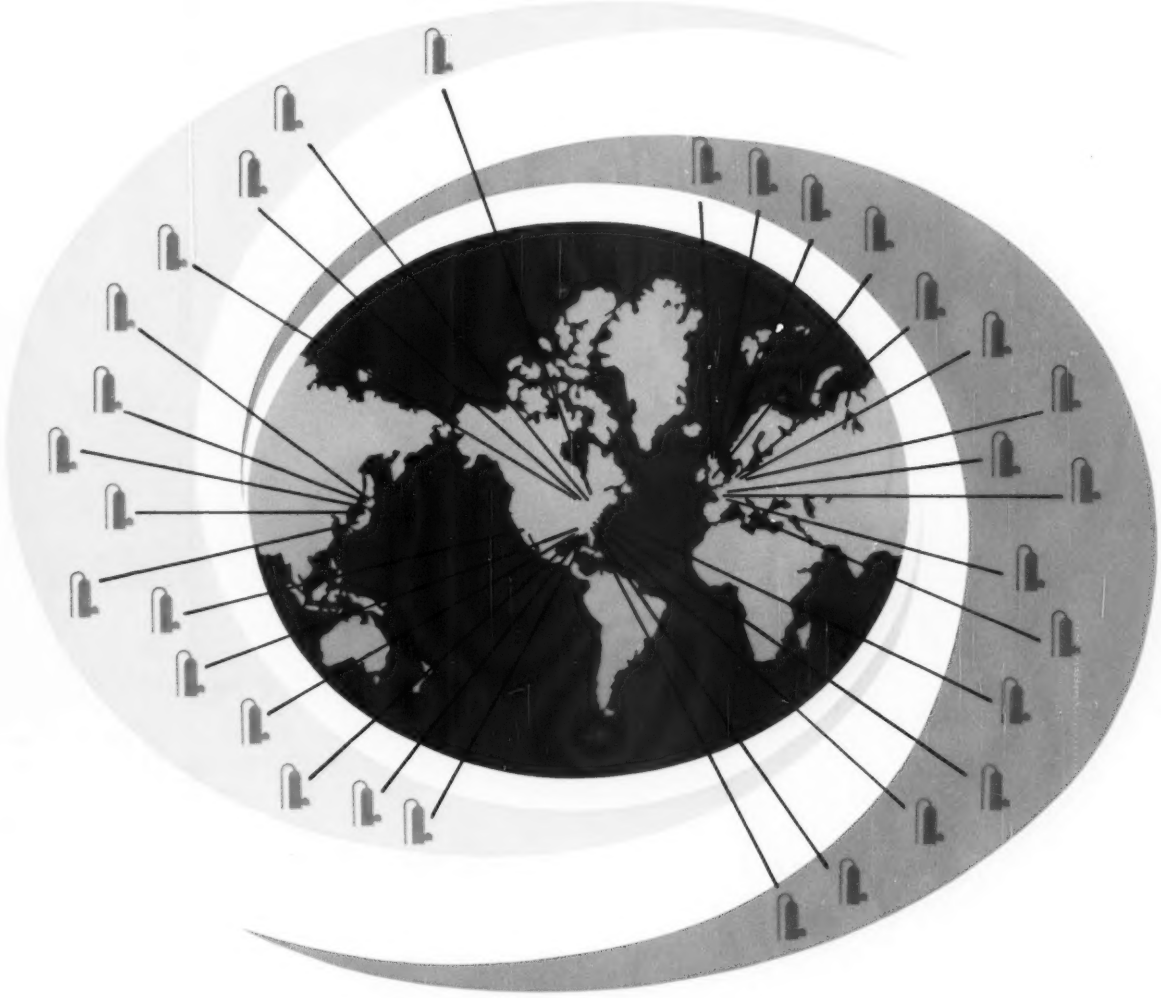

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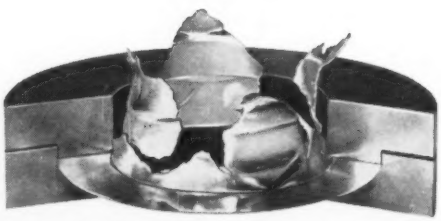

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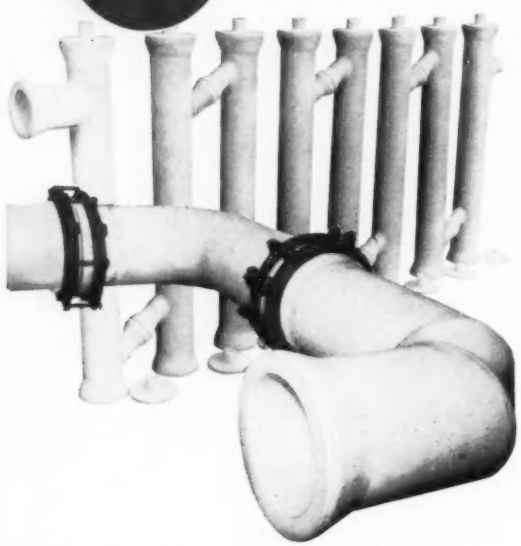

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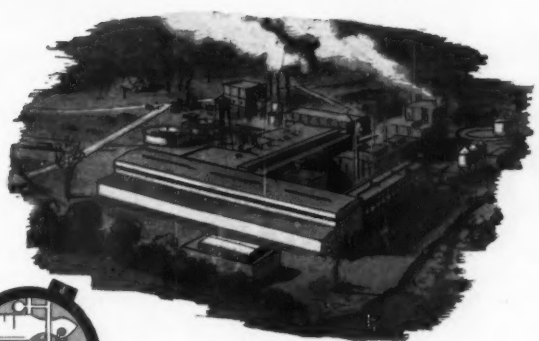

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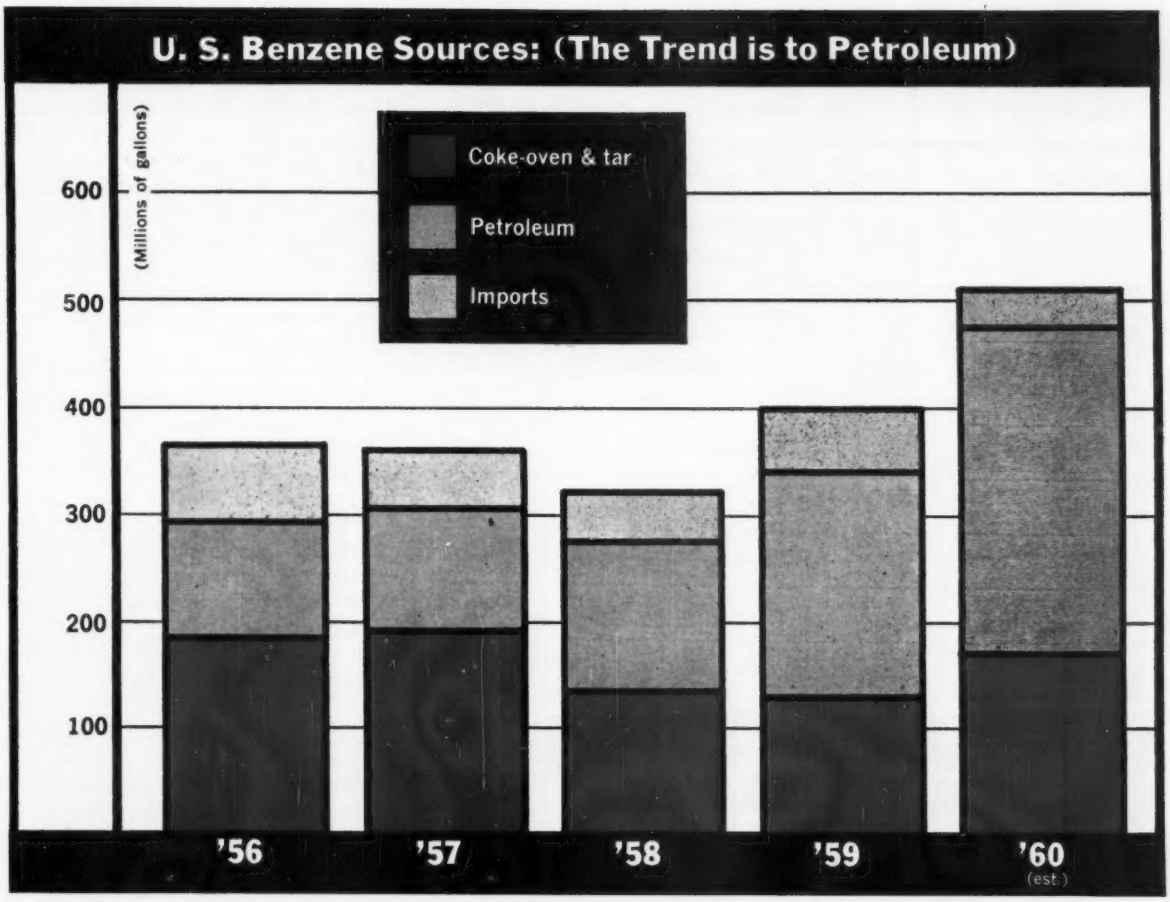

Benzene: Better Days Ahead

Expansions will forestall long-range benzene shortages; indeed, all-out petro-benzene plans may swing the pendulum toward oversupply by '62

Black market in benzene? Not quite. But the supply situation, especially in the U.S., is still critical. Consumers are being shorted; producers' inventories are practically nil; prices, in some instances, are being padded. Before the end of the year, though, relief will come. Total benzene availability—from imports, coke-oven, petroleum, and other sources—should break all records, hit a fantastic 510 million gal. Compare that with the previous top, last year's 395 million gal. (*see chart above*).

Factors that will pull benzene supply and demand into better balance:

(1) An increase in output of coke-oven material as the steel industry sails out of its months-long doldrums. (Experts now predict that U.S. steel production this year may add up to approximately 115 million ingot tons, comparing favorably with prestrike levels.)

(2) An anticipated letup (though perhaps slight) in the worldwide runaway demand for benzene in the manufacture of styrene, phenol, insecticides, and other derivatives.

(3) Availability of more petroleum-derived benzene from new and expanding plants. Such installations have been churning out the material at record rates—close to 27 million gal. last month—trying to keep pace with the surging demand following last year's four-month steel strike. (In October, for example, Sunray starts up a new 9 million gal./year ben-

Major U.S. Petro-benzene Producers

Producers	Plant locations	Estimated capacity (million gal./year)
Amoco	Texas City, Tex.	15
Ashland Oil	Catlettsburg, Ky. N. Tonawanda, N. Y.	15 3
Atlas Processing	Shreveport, La.	9
Continental Oil	Lake Charles, La. Ponca City, Okla.	5.5 6
Cosden	Big Springs, Tex.	6
Delhi-Taylor	Corpus Christi, Tex.	18.5
Eastern States	Houston, Tex.	10.5
Great Southern	Corpus Christi, Tex.	9
Gulf Oil	Port Arthur, Tex.	32
Humble Oil	Baton Rouge, La. Baytown, Tex.	12 30
Leonard Refineries	Mt. Pleasant, Mich.	6
Pure Oil	Smiths Bluff, Ark.	8
Richfield Oil	Wilmington, Calif.	18
Shell Oil	Houston, Tex. Wilmington, Calif.	17 9
Standard Oil (Calif.)	El Segundo, Calif. Richmond, Calif.*	25 6
Standard Oil (Indiana)	Whiting, Ind.	15
Sun Oil	Marcus Hook, Pa.	18
Sunray	Tulsa, Okla.	9
Suntide	Corpus Christi, Tex.	6
Vickers Petroleum	Potwin, Kan.	2
* Not operating	Total	310.5

In addition, the following companies turn out non-coke-oven benzene as by-product of styrene manufacture: Dow, at Freeport, Tex., an estimated 4.5 million gal./year capacity; Monsanto, at Texas City, Tex., 3 million gal./year; Velsicol, at Marshall, Ill., 5 million gal./year, bringing U.S. non-coke-oven benzene capacity to about 323 million gal./year.

zene unit at Tulsa, Okla. (*see left*).

Petro Push: Petro-benzene expansions and new plants (most of which are due to start operating next year) will likely be the biggest deterrent to any long-range benzene shortage. These new facilities will boost total U.S. capacity more than 100 million gal./year by late '61 or early '62.

Largest of the newcomers is Texas Oil, coming in next year with an imposing 30 million gal./year plant at Port Arthur, Tex. Gulf and Sun Oil each plan 12 million gal./year expansions at their refineries near Philadelphia, Pa.

And Ashland Oil only recently began construction of its new benzene plant at Catlettsburg, Ky. Although Ashland pegs size of the plant at 15 million gal./year, the unit is designed to produce an initial 4 million gal./year of benzene, with additions planned if market conditions continue favorable. The company is also planning to increase its present 3 million gal./year plant at North Tonawanda, N.Y., with a new 10 million gal./year UOP hydro-dealkylation (Hydeal) unit to be completed in early '61.

Chemoil (New Orleans, La.) is scouting for a site on which to put up a new refinery capable of turning out some 3 million gal./year.

Suntide, which now has capacity to turn out approximately 6 million gal./year of benzene at Corpus Christi, Tex., will nearly triple capacity with completion of a hydrodealkylation unit early next year.

In mid-'61, Tennessee Oil Refining's now-building aromatics plant at its Chalmette La., refinery, will start producing some 8 million gal./year.

Spurred by the present tight supply situation, other oil companies (Mobil is one) are studying the economics of a benzene project. By early '62, U.S. petro-benzene capacity alone may easily exceed 425 gal./year—nearly as much as the production from all sources estimated for this year.

These upcoming expansions mirror the market pattern prevalent a couple of years ago when petroleum producers' forced output (to meet earlier pressing demand) contributed to a benzene oversupply that drove domestic prices down 5¢/gal., to 36¢.

Petroleum benzene makers, by such all-out efforts, indeed may have been too successful in filling the valleys

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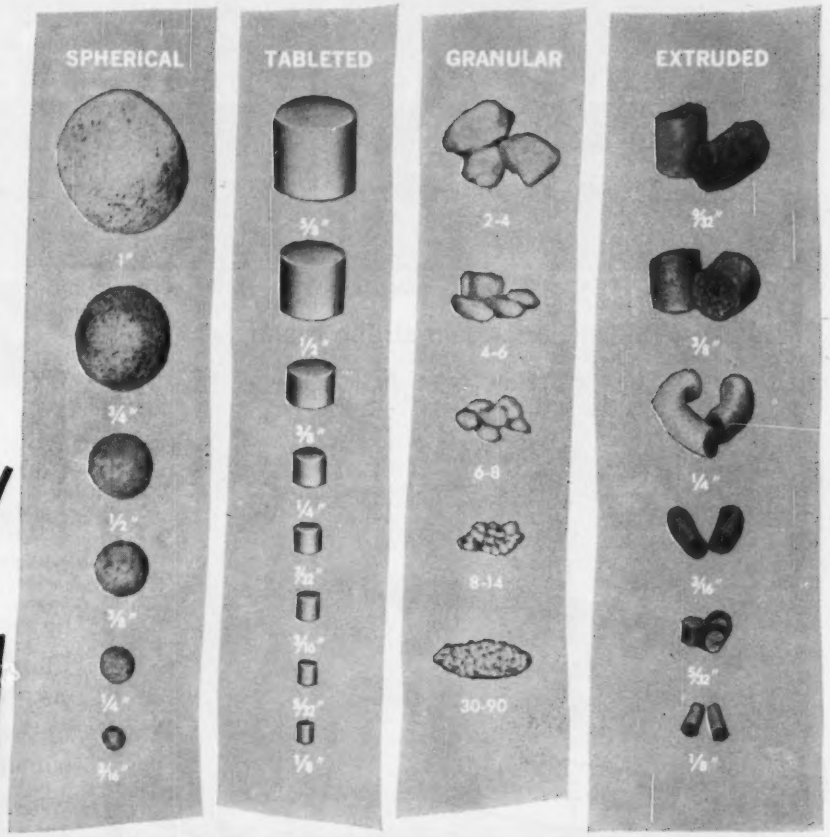

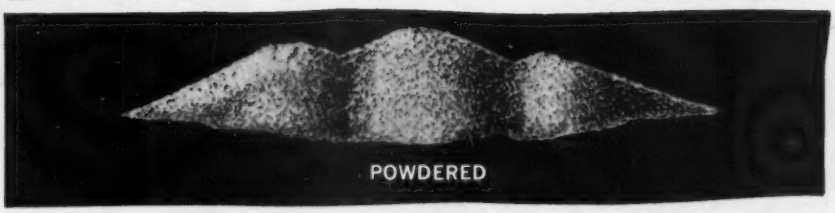

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news briefs...

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Illustrations courtesy of Molded Fiber Glass Boat Company, Union City, Penna. These lapstrake-type fiber glass hulls are made in matched metal dies. MFG makes 13, 15 and 17-ft. models.

M & C paint chemist checks condition of painted masonry samples from Weather-Ometer unit in Menlo Park, N.J., Research Center. Outside paints are also tested on test fences.

Outside Latex paints with ASP 400 show less chalking, better viscosity stability, superior color retention

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Benzene Consumption
(millions of gal.)

	1960	1957
Styrene	205	145
Phenol	95	75
Nylon	40	30
Synthetic detergents	36	24
Aniline	17	16
DDT	16	14
Maleic anhydride	12	10
Diphenyls	4	4
Benzene hexachloride	2	4
Exports	15	3
Other	43	31
Total	485	356

Benzene Imports
(thousands of gal.)

	From USSR and Satellites	From Other Countries
1955	27,781	4,299
1956	59,417	10,128
1957	38,686	16,637
1958	31,375	13,170
1959	44,592	12,744
1960 (est.)	35,000	5,000

and leveling the hills of coke-oven benzene production. If the current, unprecedented rate of petroleum-derived output continues—and industry consensus is that it will—the supply of petro-benzene this year will easily top the 300-million-gal. mark, and may run as high as 320 million.

Coke-oven benzene will probably not recover from the present tightness until at least October, when steel operations will be rolling in high gear to meet auto makers' needs for '61 model cars. If, as currently estimated, coke-oven benzene installations will be operating at 75-80% of capacity by the fourth quarter, total output for the year would be 160-170 million gal. If a decent operating rate is slower in coming about, such production may drop to 155 million gal.

(Annual rate prior to the steel shutdown was about 190 million gal. from coke-ovens that can produce, at best, some 205 million gal./year. Tar distillers consistently produce 10-12 million gal. of benzene a year, excluding imported material that is refined here, while less than 15 million gal./year is available from non-coke-oven sources such as styrene manufacture.)

Foreign Pressures: If it has done nothing else, the present benzene shortage has toned down criticism of foreign importations, especially of Red-tinted material. Since '55, at least, amounts hitting the U.S. market from Russia and Poland have far exceeded those imported from other countries (*see table, left*). In recent years, most of this material (57 million gal. last year), was brought in under contract to Dow. The deal expires at the end of this year, and Dow may not renew.

The possible cutoff of this sizable supply source, combined with pressing consumer demand and hobbled coke-oven production, may well boost benzene prices above the current 34¢/-gal. domestic tank-car level. If the fourth-quarter increase comes—and it may be as much as 6¢/gal.—the industry will hear about it by Sept. 1, to fulfill the contract condition that producers give customers 30-day notice of change.

Although a few major buyers are still getting all the benzene they need, some contract consumers have been hit with allocations and delivery delays. But spot buyers are even worse off—some are already paying 35-40¢/-gal. for needed supplies.

And pointing up the global tightness is this: Latin American and European buyers are shopping around for odd lots of available U.S. material and paying 10-12¢ premium when they can find any. At least one Mexican user, reportedly, was unable to place a million-gallon order—and he was willing to pay 42¢.

The situation is apparently ripe for Russian maneuvering. Word in the trade last week was that the USSR had made a deal to supply Germany with 15-20 million gal. of benzene at slightly under 40¢/gal. In this country, *CW* learns, benzene consumers have been offered Russian material at an exorbitant 50¢/gal. There are no takers, of course, and chances are the Reds may only be taking the pulse of the American market, trying to determine exactly how acute the demand is.

With the present prospect of premium prices holding, this year's U.S. exports of benzene are expected to more than double the 7 million gal. shipped out in '59. Fact is, if material can be spared, such exports may hit 20 million gal. because of the unusually heavy demand in Canada, South America and abroad.

In France, Germany, Italy and Austria, for example, benzene requirements for manufacture of styrene, phenol, synthetic detergents and other derivatives already far exceed available supply. Even in England, where sizable quantities are still sold as motor fuel, a benzene shortage may well develop as early as '63, says petrochemical expert Herman K. Nieuwenhuis of Chemical Projects (New York), in his just-completed comprehensive "Petrochemical Profile of Western Europe."

Outlets Surge: In the U.S., benzene-consuming outlets are also expected to continue stretching toward new highs. Take styrene: if all the proposed U.S. styrene monomer plants are built, total capacity by the end of '61 will soar above 2.1 billion lbs./year. This would push benzene requirement to at least 250 million gal./year—or about 20% more than will likely be needed this year (*see end use pattern, left*).

Production of synthetic phenol, nylon, dodecyl benzene (for synthetic detergents), maleic anhydride, and other outlets this year will require nearly 485 million gal. of benzene. That's an increase of more than 35% over requirements of three years ago.

The present turmoil in benzene markets will simmer down, of course, with increasing production from newly installed benzene facilities in the U.S.; and prices will be stabilized. But the hectic rush to expand may well raise a new specter—oversupply—to plague the market next year.

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FR-S 181—A light-colored, non-staining, non-discoloring lowest plasticity rubber, especially tailored to the processing of chemically blown sponge because mixing time is reduced and no peptizing agents are necessary.

FR-S 1000—An exceptionally versatile, general purpose rubber. Excellent results in most black or dark compounds. Easy processing characteristics; especially useful in making hard rubber products, such as molded and extruded goods, tire body stocks and treads.

FR-S 1001—Combines good aging properties with only slight stain and discoloration tendencies. Special end uses: light-colored shoe soles, heels, floor tiles, moldings and extrusions. Like all FR-S butadiene-styrene polymers, it is easily processed, highly uniform.

FR-S 1004—Low in water absorption and water-soluble impurities. Special uses: electric insulation and battery cases; can-sealing compounds and food jar gaskets. Good physical properties; ages well.

FR-S 1006—Ultra-light-colored, non-staining polymer; minimum of costly white pigment required; adds impact strength to light-colored plastics. Special uses: white sidewall tires, floor tiles, coated fabrics, shoe soles, household goods.

FR-S 1007—Low voltage electric grade rubber with low water-absorption properties. Special uses: electrical applications as in wire and cable insulation; excellent for a variety of hard rubber articles and gaskets.

COLD RUBBER TYPES

FR-S 1500—High tensile; easy to

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FR-S 195, SOLUBLE IN STYRENE, SHATTERPROOFS PLASTIC "PILL BOXES." Exceptionally light colored and non-staining, FR-S 195 is "*the* finest polymer" for products of high-impact polystyrene: plastic cases for radios, razors, cosmetics, etc. Breakage is minimal. Rigorously inspected to polystyrene standards for cleanliness, viscosity, dissolving time, FR-S 195 with styrene shows no yellow, gels or cloudiness, nor imperfections from faulty mixing such as fisheyes and orange peel.

RUBBER TILE BREAKTHROUGH! **FR-S 147** NOW OFFERS ALL THE PROPERTIES REQUIRED FOR TOP TILE SERVICE. FR-S 147—a super-refined rubber with a better-than-ever finish—now brings faster processing and low, low costs to rubber tile. One plant reports almost doubling its processing of rubber flooring mix with FR-S 147. Now rubber can prove and *sell* its competitive advantages over other tiles—by profitably matching their price appeal.

process; good building tack. Special uses: camelback, all tire stocks, hard rubber and mechanical goods and any products requiring premium physical properties.

FR-S 1502—Light color; non-staining; high loading capacity; flex-resistant. Special uses: white sidewall tires, kitchenware, hospital goods, sporting goods, coated fabrics, shoe soles and heels.

FR-S 146—Light color; non-staining; low plasticity; easy processing. Excellent for chemically blown sponge products, shoe soles, sporting goods, extruded items and a variety of mechanical goods.

FR-S 179—A base polymer for oil-extending rubber; extremely high viscosity. Economical, it allows compounder to add amount and type of plasticizer as desired. Good physical characteristics; excellent for mechanical goods.

OIL-MODIFIED TYPES

FR-S 184—New, improved, stabilized for tread rubber use oil masterbatch; 37.5 parts aromatic oil. Special uses: quieter riding, squeal-resisting tire treads that deliver extra mileage, camelback, mechanical goods and extruded parts. Distinctive for stability in storage, mixing and extruding.

FR-S 1710—This outstanding rubber combines 37.5 parts of non-volatile aromatic oil with a specially prepared polymer. Easily processed; more economical compounding of tire treads, mechanical goods, molded parts.

FR-S 1712—Combines a highly aromatic non-volatile oil with a specially prepared polymer. Great savings in manufacturing tire treads, camelback, motor supports, auto insulators. Its physical properties permit use of additional oil when added economy is desired.

FR-S 173—A greatly improved polymer in color, cured hardness and processibility. Used in mats, shoe soles and extruded and mechanical goods. Contains a non-staining antioxidant and 25 parts of a light-colored naphthenic oil.

FR-S 178—An economical, light-colored, non-staining rubber, extended with 37.5 parts of naphthenic oil. Offers improved color, cured hardness and processing properties particularly desirable in mats, shoe soles and extruded and mechanical goods.

SPECIALTY TYPES

FR-S 1009—A non-staining polymer used with other rubbers to smooth out and speed up calendering and tubing and to avoid distortion of uncured products. Increases dimensional control in manufacturing insulated wire, hose, calendered sheet goods, coated fabrics.

FR-S 1012—High polymer viscosity, combined with solubility in solvents. Widely used for asbestos sheet, packing, gaskets, brake lining and high viscosity cement; non-staining; high tensile strength and high modulus when cured.

FR-S 1013—A special-purpose, high-styrene rubber used in closure and can-sealing compounds. Low content of water-soluble properties, low water-absorption properties and relatively high uncured strength. Produces strong adhesives, may be used in contact with light finishes.

FR-S 1014—Made with a rosin soap emulsifier; offers exceptionally good tack and green tensile properties. Widely used in adhesives, can-sealing compounds, industrial tapes.

MASKING TAPE WITH **FR-S 182:** A COST-CUTTING PRODUCT IN ADHESIVES AND OTHER APPLICATIONS. A non-staining, non-discoloring styrene butadiene copolymer, FR-S 182's light color and high uncured strength make it particularly suitable to developing exceptionally strong adhesives. Other applications: can-sealing compounds, coated fabrics, molded and extruded products. Low in water-soluble impurities, FR-S 182 also has low water absorption characteristics; has a bound styrene content of 43 per cent.

NEW **FR-S 201:** A LOW-PRICE, NON-STAINING POLYMER THAT REDUCES COMPOUNDING COSTS. *The* most economical rubber, new, further-improved FR-S 201 is a perfected 50-part oil-extended polymer that reduces compounding costs to a new low. Its non-staining and light color characteristics—and its low cost—tailor it to volume use in such products as refrigerator door gaskets, rubber matting, housewares, appliance parts.

HIGH-STYRENE MASTERBATCH **FR-S 158** ELIMINATES DIFFICULT AND COSTLY MIXING OPERATIONS. A 50-50 masterbatch of 1502 and a reinforcing high-styrene resin, FR-S 158 is compounded in the latex state for perfect dispersion and fast, efficient mixing operations. Shipped in easily compounded pellets, FR-S 158 imparts special stiffness or hardness, good physical characteristics, abrasion resistance, moderate flex resistance to light-colored rubber products, such as shoe soles, flooring, high-pressure tubing.

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with the precise characteristics and production economies you are looking for

FR-S 200—THE NEWEST AND MOST OUTSTANDING SYNTHETIC LATEX DEVELOPED FOR THE FOAM RUBBER INDUSTRY. Designed for use in all foam applications, either 100% or in combination with some low-ammonia natural latex. Properties: superior processing characteristics, very high solids content provides excellent gel sensitivity, good structure, accepts higher pigment loading.

LOW-COST FR-S 176 FOR TEXTILE-COATING COMPOUNDS. For carpet and upholstery backing that upgrades feel and appearance in any fabric—for better adhesives, for saturated papers—FR-S 176 is, *penny for penny*, the highest solids latex available (49% solids). Highly resistant to ultra-violet light, heat aging, gas fading. Stable to mechanical action and to compounding ingredients. Another economy plus: its reduced water content means less drying time. Whatever your problems, your compounder can use this cost-shaving latex to your distinct advantage.

FR-S 174 PROVIDES INCREASED "HAND," MORE STIFFNESS AND STRENGTH IN CARPET-BACKING COMPOUNDS. Tufts locked in, problems locked out—that's the sales-stimulating story of FR-S 174 when used in carpet-backing compounds! A styrene-butadiene resin latex, FR-S 174 is an ideal stiffening agent for both natural and synthetic latices. It provides increased "hand," rigidity and rip strength for carpet-backing and foam. 50% solids.

FR-S 2000—The most widely used latex for its economy, stability and high tensile strength. Used for flexible, durable upholstery, textile and carpet backing; or with resins to saturate tire cords for greater adhesion. Good for pigment and fiber binding. 42% solids.

FR-S 2001—Outstanding for paper saturation in both beater and web processes. Used to increase flexibility and tear strength. Highly stable, and offers lower molecular weight for better adhesion, still retaining good tensile strength. 42% solids.

FR-S 2002—For premium back-sizing applications requiring extra light color. Excellent for upholstery and pile carpet; will not discolor conventional dyes. Can be sulphur-vulcanized; provides flexible coatings and films with very good strength. 50% solids.

FR-S 2003—A high-solids latex specially desirable where light color and low cost are important. Cuts costs by improving foam compound stability. Also used as a resin and plastics additive for better strength and flexibility. 60% solids.

FR-S 2004—A polybutadiene polymer latex which has a particular application in the manufacturing of high-impact plastics. It also is excellent for specialized latex foam uses, where light color and freedom from odor are important. 59% solids.

FR-S 2006—A superior chewing gum base, this latex may also be co-coagulated with rubber pigments for dry masterbatches with excellent dispersion and good processibility. Increasingly popular for asphalt paving and roofing. 28% solids.

FR-S 2105—A general purpose high-solids latex combining high tensile strength with low-temperature flexibility. Cuts manufacturing costs of foam products and offers excellent strength, flexibility and pigment loading capacity for backing and sizing of carpets and textiles. 62% solids.

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Synthetic Dry Rubbers:				147	195	182	201	158	181	1000
	1001	1004	1006	1007	1500	1502	146	179	184	1710
	1712	173	178	1009	1012	1013	1014			
Latices:	200	176	174	2000	2001	2002	2003	2004	2006	2105

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CITY _____ **ZONE** _____

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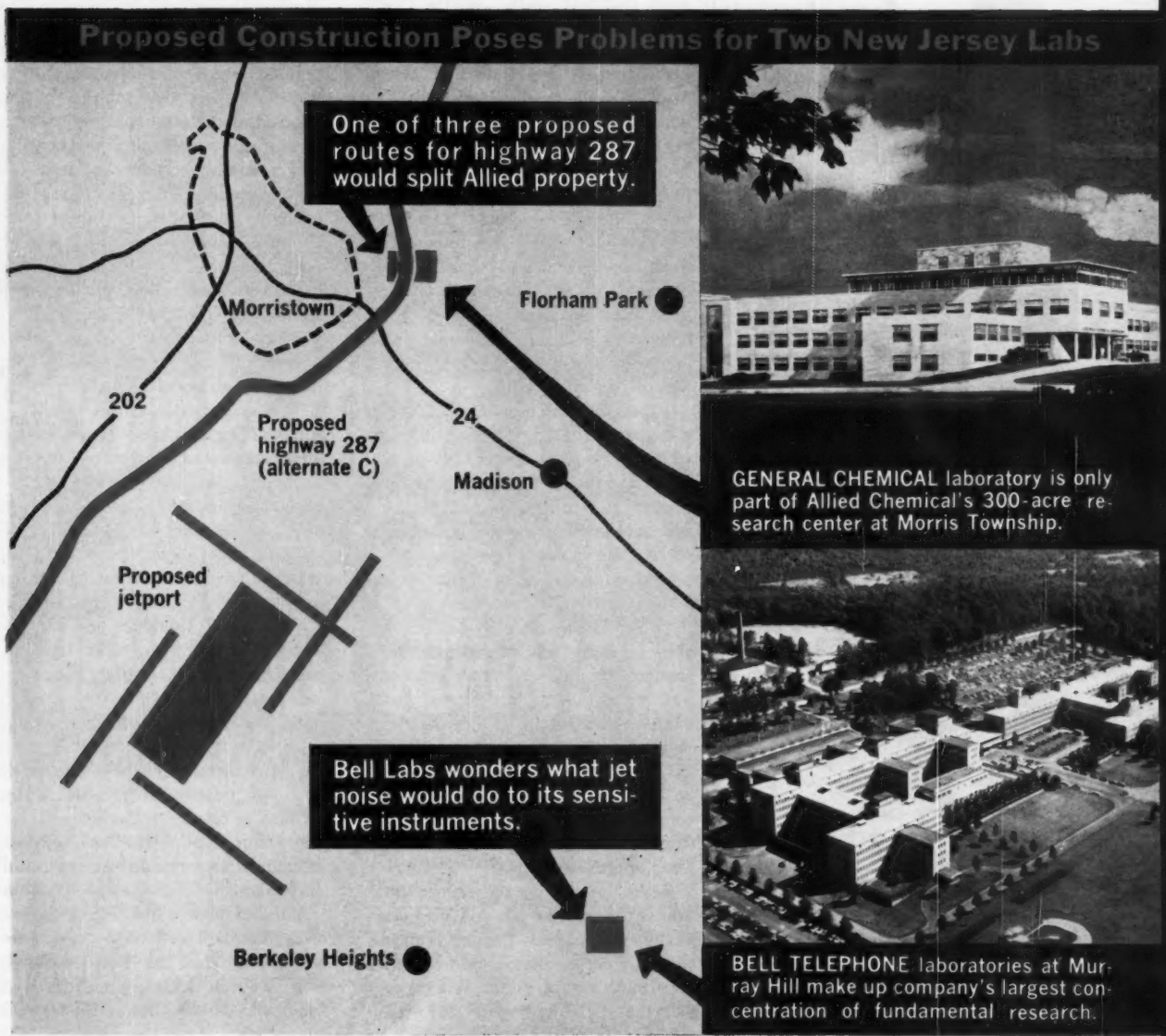

Proposed Construction Poses Problems for Two New Jersey Labs
One of three proposed routes for highway 287 would split Allied property.
Florham Park
Morristown
202
24
Proposed highway 287 (alternate C)
Madison
Proposed jetport
Bell Labs wonders what jet noise would do to its sensitive instruments.
Berkeley Heights
GENERAL CHEMICAL laboratory is only part of Allied Chemical's 300-acre research center at Morris Township.
BELL TELEPHONE laboratories at Murray Hill make up company's largest concentration of fundamental research.

Highways and Jetports—New Lab Worries

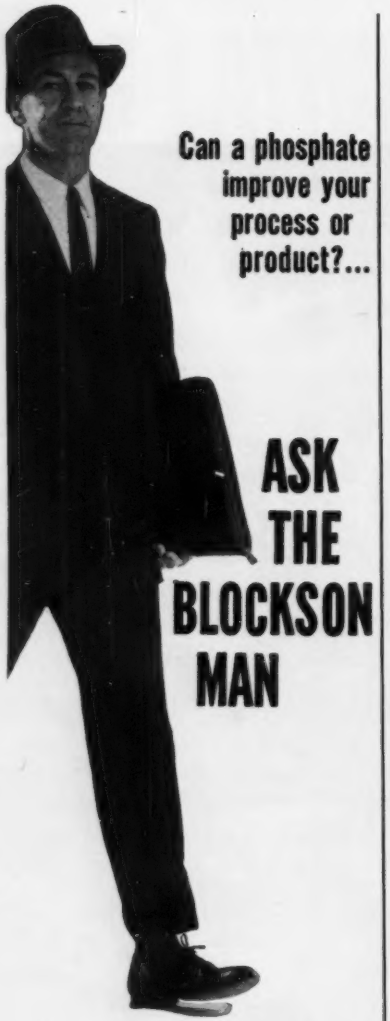
Allied Chemical Corp. recently threatened to move its corporate research center in Morris Township, N. J., if a proposed highway route through its property is approved. And less than 15 miles away, Bell Telephone Laboratories is seriously worried about the possibility of a jet airport being built nearby.

Only two of several examples, these instances foreshadow growing problems that many more suburban and "country" research laboratories will be facing as big new government road- and airport-building programs get into full swing.

Although the densely settled Northeastern U.S. is the most likely area for such problems to occur, similar instances have already been reported from the Southeast, the Great Lakes area and the Pacific Coast. More cases are bound to crop up as the result of conflicting interests of neighboring municipalities that want the convenience of new construction, but prefer it "just outside of town."

Depending on the nature of the construction—and the amount of inconvenience it would cause others in the neighborhood—the company may avert disruption if it takes action early enough. Other projects may only be in the nuisance catagory and thus not warrant action. In many cases, moreover, the proposed construction may actually benefit the laboratory and merit its support.

Highway Hassle: Allied's highway



A Sodium phosphate is a team player. It works well with other chemicals. A good example is petroleum based synthetics. Certain phosphates materially improve their performance.

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problems in New Jersey actually involve three government bodies: the State Highway Dept., Morris Township and Morristown. Of three alternate routes for proposed federal highway 287, the State and Morris Township favor one (designated A), which would bypass Allied's lab but would go through the heart of Morristown. In turn, Morristown is pushing consideration of the two other alternative routes. One, (B), which would go through a corner of Morristown, would also miss Allied's property. But the third (C, *on map*) would cut off about 40 acres of the company's 300-acre site while avoiding Morristown altogether. This is Morristown's first choice.

Faced with the possibility of having a highway running through its now-secluded research center, Allied sent company lawyer Frank Valgenti to present the company's position at a recent public hearing on the alternate routes. He pointed out that Allied now pays annual taxes of over $100,000 to Morris Township and its more than 500 employees provide considerable business for Morristown merchants. But his strongest argument was based on a previously unannounced expansion of the facilities that would bring total employment to 2,000. Not only would this expansion be jeopardized, said Valgenti, but the company would have to move its whole lab if the objectionable route were approved.

Result: Although the State's decision is 6-9 months off, Allied is practically assured of having won its battle. George Burke, Morristown's Superintendent of Public Works, says that the route he favors and Allied opposes will probably "receive the least recognition of the three proposals."

Jetport Action: In another North Jersey development, the Port of New York Authority last December reported that a site in Morris County was the only one in the metropolitan New York area that met all its criteria for a new jet airport. An immediate storm of protest was raised and was formalized by the establishment of the Jersey Jetport Site Assn.

Although the proposed location would not affect the land of any companies, Bell Telephone Laboratories was immediately concerned about the effect of jet noise and vibrations on delicate electronic instruments at its nearby Murray Hill labs. Accordingly, in January it set up a company committee to explore all the ramifications of the proposed jetport. At the same time, it urged employees to inform themselves on the subject, saying, "Each individual should feel free to form his own opinions and take whatever action he feels appropriate within his community." Thus, although the company has taken no offical steps, many of its employees have taken action. Among them: President James Fisk, who lives in New Vernon (which would be wiped out by the jetport) and is a trustee of the Jersey Jetport Site Assn. and co-chairman of its technical advisory committee.

The company study committee is still working, probably won't have a final report ready for several months. Its initial findings are that the jet problem may not be as bad as originally feared, but would still have some adverse consequences. It has told employees that, under present conditions, "jet noise, vibration and air pollution would not seriously affect the technical programs. It is possible, however, that some Laboratories areas concerned with sensitive measurements might require special consideration." Another problem that concerns the committee is the possibility of population growth in the area as a result of the jetport, further taxing existing facilities, services, ground transportation and cultural development of the area.

Final choice of the site is months away, but Bell and others concerned are hoping that the Port Authority won't be able to overcome the legal hurdles in its way. Before the site can be approved, both the Governor and the state legislature must clear the way—actions that are now considered improbable.

Nearby Nuisances: When the construction project isn't big enough for the company to protest vigorously, the laboratory may have to contend with resulting nuisances. A few years ago California Research Corp. had about 100 yards of attractive grounds in front of its Richmond, Calif., lab. When plans were made to build an approach to the San Rafael Bridge across this land, the company decided not to protest. Result: a two-story-high embankment and road right next to the lab entrance. In addition

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Case histories of economies resulting from Fluoroflex-T are being increasingly reported, citing ease and speed of installation with prefabricated lengths, lower checkout time, decreased maintenance, long equipment life, and elimination of process headaches and downtime. One plant equipped with Fluoroflex-T, in fact, reported savings of $60,000 per month in costs of maintenance, downtime, and product loss.

Why not investigate what a Fluoroflex-TS piping installation can mean to your company, in installed costs, overall economy, and long process life? Write for complete information today!

Complete corrosion protection: Fluoroflex-T, the proprietary Teflon® product manufactured and fabricated solely by Resistoflex, is completely resistant to any chemical (except high-temperature fluorine and the molten alkali metals) up to 500° F.! It combines optimum strength and non-porosity.

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- Liner in thermal equilibrium with housing, stays in place despite wide temperature variations, eliminating fatigue collapse and flare cracking.
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- Fittings compatible with all standard piping systems.
- Complete family of piping components available.
- Gasket and sealing problems eliminated by integral gasket formed from liner over full face of flange.

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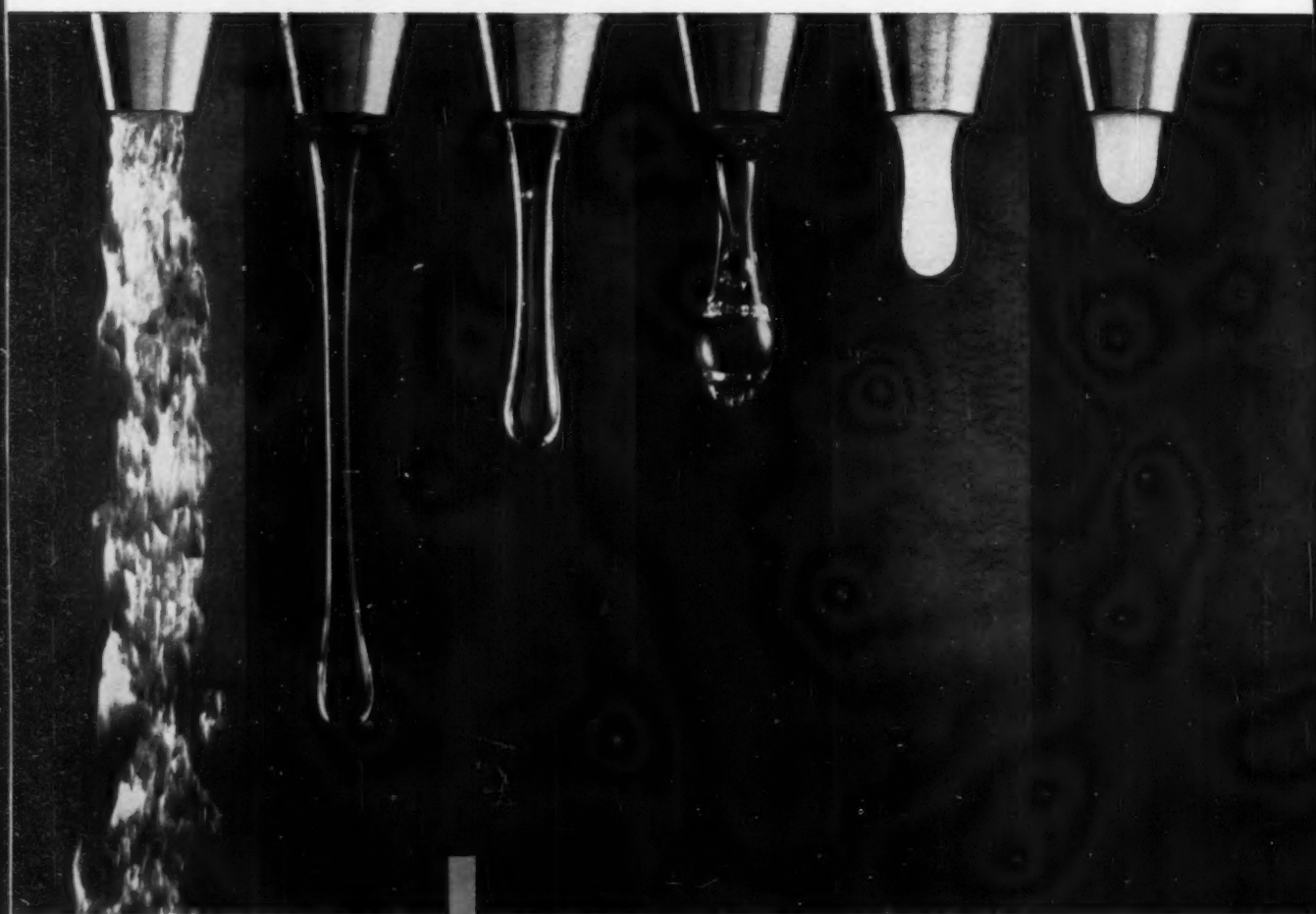
Dow **C.P.I.** *file* **2**

EMULSIFICATION

EMULSIFIER INTERMEDIATES, by their almost unlimited number and properties, allow many emulsion formulations not possible with the usual commercial emulsifiers. Two such intermediates, polyglycols and alkanolamines, are outstanding for their ability to form excellent surfactants. Shown below are samples of polyglycols useful as surfactant intermediates and which are available in a virtually limitless range of viscosities.



For tailor-made surfactants, use these polyols from "the men that make the most of them"

PROPERTIES OF DOW POLYGLYCOLS

	description	viscosity range cks, 100°F.	approx. sol. g./100g. water at 25°C.
POLYETHYLENE GLYCOLS E200-E20,000*	viscous liquids to hard solids	20 to solid	∞
POLYPROPYLENE GLYCOLS P250-P4000*	viscous liquids	27.7 to 545	P250-400 ∞ P1200 2 P2000 up <0.1
POLYBUTYLENE GLYCOLS B500-B2000*	viscous liquids	58 to 258	all <0.1
POLYEPICHLOROHYDRIN 450-1150*	viscous liquids	387 to 3650	all <0.1
POLYSTYRENE GLYCOLS 500-750*	viscous liquids	10830 to 26000	all <0.1

*Numbers indicate average mol. wt.

ESTERIFICATION

WIDE SOLUBILITY, LOW TOXICITY MAKE POLYOLS EXCELLENT SURFACTANT INTERMEDIATES

Excellent ability as surfactant intermediates is shown by many of the Dow polyglycols. Because of the extremely wide choice of Dow compounds in this class, chemists can use them in surfactant production and be highly specific about low toxicity, low reactivity, specific solubilities in water and organics, and other properties.

Polyglycol intermediates used in the production of fatty-acid esters give controlled surface action useful in washing, softening, dyeing, and finishing. Being nonionic, the polyglycol fatty acid esters are important as suspending agents for dye pigments and as emulsifiers for oils and greases in fat liquoring. These esters find wide use as surfactants, dispersants, and wetting agents. Hydrophobic polyglycols can be converted to surface-active agents by sulfation, polyethylation, or reaction with other water-solubilizing intermediates.

Dow is basic in polyols. By having the widest line of starting oxides (ethylene, propylene, butylene, styrene, and epichlorohydrin), Dow has the ability to produce an unlimited number of new compounds. And by being a producer of all starting and intermediate materials, from hydrocarbon to oxide to glycol to polymer, Dow achieves a polyol quality which is a standard for the industry.

In addition to the availability of the polyglycols formed by adding a single oxide to a single glycol, Dow has developed a technology covering an unlimited number of variations using other starting materials. (See chart.)

SPECIFY NEEDED SURFACTANT PROPERTIES THROUGH DOW POLYOL VARIATIONS

SINGLE OXIDE + SINGLE GLYCOL
These are represented by all the standard Dow polyols described at the left. They are all available with complete technology.

ADDITION OF TWO OR MORE OXIDES TO A POLYOL
Problems that affect the "single" polyglycols above can often be overcome by multiple-oxide compounding. Example: high molecular weight polypropylene glycols have many useful properties but they are insoluble in water. Dow polyglycol 15-200, made from two oxides, is soluble in both water and organic solvents.

ADDING PROPYLENE AND ETHYLENE OXIDE TO MATERIALS OTHER THAN GLYCOLS—Starting materials such as propylene oxide or ethylene oxide reacted with phenols and fatty acids are used in making several surfactants valuable as emulsifiers, detergents, and wetting agents. The important property achieved is surface activity resulting from a proper balance of oil solubility and water solubility in the molecule.

ADDING COMBINATION OF OXIDES IN "BLOCKS"
Usually, when two or more oxides are used, they are added simultaneously and the resulting polyglycol represents a compromise between the properties of each oxide. However, adding oxides separately—by block addition—means that the properties of each may exist side by side. Many surfactant manufacturers use the block addition method to get the right hydrophilic-hydrophobic balance for surface activity.

Find out how "tailor-made" Dow polyols can solve problems or improve your existing products for you. Write to "The men that make the most of them."

SAPONIFICATION

MIXED ISOPROPANOLAMINE GIVES SOAP BETTER SOLVENCY AND COLOR STABILITY

Mixed isopropanolamine, a new member of the Dow alkanolamine family, has superior emulsification characteristics (better solvency and color stability) while retaining most of the desirable characteristics of other alkanolamines. Like triethanolamine, mixed IPA combines with free fatty acids to form soaps. These soaps find wide use as emulsifying agents for low-cost, easily prepared, stable emulsions. But here's a valuable difference. The soaps of mixed IPA are *completely* soluble in hydrocarbons such as naphtha, gasoline, and mineral oil in all proportions whereas TEA soaps are not. This property of mixed IPA yields solvent emulsions with greater stability.

Color stability is another outstanding characteristic of mixed IPA. Both the increased emulsion stability and the resistance to color change are important in products subject to long storage periods or extended shelf life. Mixed IPA may be substituted pound-for-pound for TEA since the equivalent weights of the two are approximately equal. Mixed IPA soaps are used as emulsifiers in dry-cleaning soaps, soluble textile oils, wax removers, metal cutting oils, cosmetics, emulsion paint, and in other products.

MIXED IPA SPECIFICATIONS		TYPICAL PROPERTIES	
Monoisopropanolamine	10—15%	Freezing Point	−30°C.*
Diisopropanolamine	40—50%	Pounds Per Gallon at 25°C.	8.37
Triisopropanolamine	40—50%	Viscosity at 25°C., centipoises	969
Apparent Equivalent Weight	137—143	Viscosity at 60°C., centipoises	44.6
Water, Maximum	0.5%	Flash Point (Cleve. Open Cup)	255°F.
APHA Color, Maximum	100	Fire Point (Cleve. Open Cup)	260°F.
Specific Grav. 20/20°C.	1.002—1.012	Odor	Slightly Ammoniacal

*Sets to a glassy solid below −30°C.

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Write for Data Sheet or Consult Chemical Materials Catalog Page 199

LUCIDOL DIVISION

WALLACE & TIERNAN INCORPORATED
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to destroying part of the esthetic qualities of the lab, the new road also eliminated any future expansion of the lab in that direction.

Georgia Institute of Technology has run into a similar and more serious problem. About four years ago it established a lab in the woods north of Atlanta for radio studies of meteors. Now the school is looking for a new location for the lab because of residential expansion that's caused interference from auto ignition and electrical lines.

Not about to move because of new jet traffic nearby is Union Carbide Corp.'s lab near Cleveland's Hopkins Airport. Recent lengthening of runways did not affect company land and the lab is not in the direct glide path of the larger jets. Carbide is hoping

Keener Sight

Researchers at Royal Dutch/Shell's Amsterdam laboratory have enlisted the aid of a much-studied, but little-used instrument in their work on metallic catalysts. It's the electron emission microscope (*shown above*), which is capable of linear magnification of one million times. Differing from a commercial electron microscope—which bombards the sample

that jet vibration won't be any greater than that of passing trucks, for which its instruments are already adequately shock-mounted.

Luckier Ones: Many times, of course, new construction can work to the benefit of research laboratories. Abbott Laboratories will lose a small part of its land in North Chicago to a new industrial highway planned by Lake County, but it's happy to do so. The new road will give the company a much-needed improved traffic outlet.

Stauffer Chemical Co. is also pleased with planned construction across from its new lab at Richmond, Calif. Now a run-down area, the neighborhood is due for a major pickup as the result of a planned $12-million housing development. Al-

for Catalysis

with electrons, uses electromagnetic lenses to enlarge the image—the emission type operates on the principle that the specimen will emit electrons upon application of a high voltage. The image is formed directly on a phosphor-coated viewing screen, shown glowing at the right. Main drawbacks: need for intricate sample preparation, very high vacuum.

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Consult Chemical Materials Catalog Pages 173-175 for further data.

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though the freeway between the two properties will be widened and traffic will certainly increase, Stauffer sees no problems with the new development, looks forward to a benefit in the way of improved surroundings.

Planned Isolation: Most companies that report no trouble from construction near their labs made every effort before they selected a site to insure that such problems wouldn't arise. Diamond Alkali, for instance, had to consider the relocation of two Ohio routes (just recently accomplished) before it selected the site for its Painesville, O., research center several years ago.

Probably one of the most extreme efforts to get off by itself was made by Pratt & Whitney Aircraft in its efforts to find a location for a jet and rocket R&D center. To make sure that civilization couldn't venture close enough to be bothered by the noisy tests, P&WA bought 9,000 acres about 20 miles from West Palm Beach, Fla., then turned 2,000 acres of the land over to the state for use as a wild-life sanctuary.

Since most companies can't go to this extreme in planning for new labs, however, companies that are planning to build or that already have labs in choice settings are well advised to keep on the lookout for nearby local construction plans that might dislocate their operations. A little early action can pay big dividends.

EXPANSION

• A new research institute will be established by the University of Kentucky at its Spindletop Farm in Fayette County. The new institute will serve an industrial park, which is planned for another Spindletop tract. A joint federal-state coal research project may also be handled by the institute.

• The Senate has passed a bill to set up an Office of Coal Research in the Dept. of the Interior. Appropriations up to $2 million have been authorized for fiscal '61.

• Developmental Engineering Corp. will build a laboratory at Boulder, Colo., this year. In addition to its main work in communications and power antenna research, the new lab will conduct studies on properties of the earth's crust, geophysical methods of prospecting and applications of solar energy.

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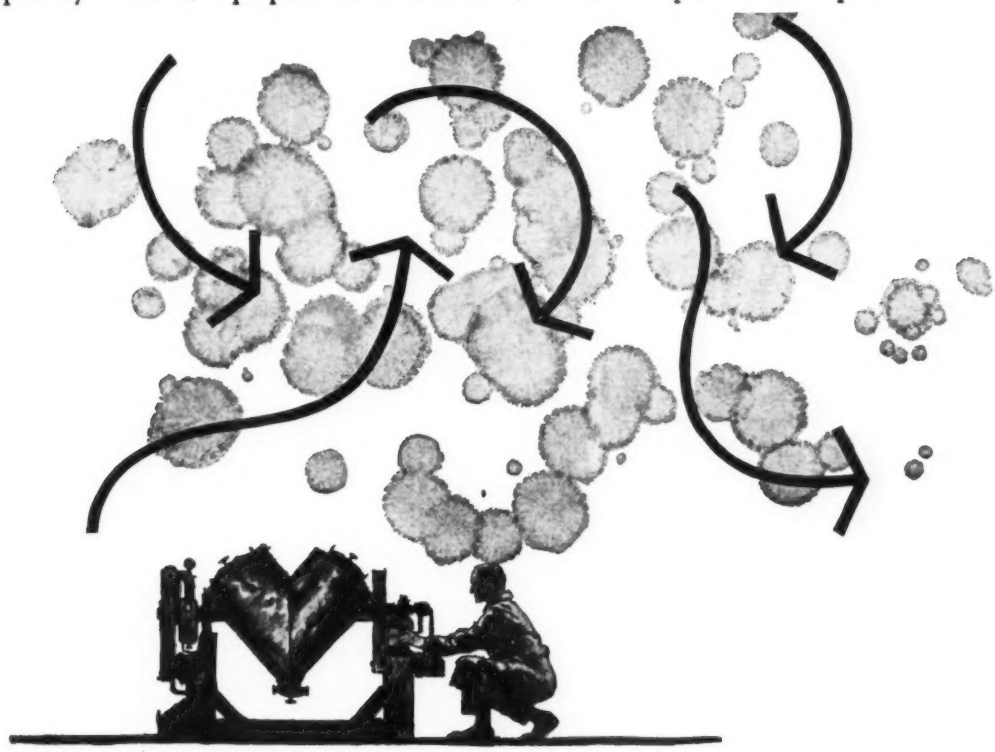

*Patented and Patents Pending

A production model of the new Solids Processor is available for testing at our Pre-Test Laboratory. Standard, intensifier and liquid-solids "Twin Shell" Blenders* are also available . . . as are packaged vacuum tumble dryers (conical type) and ribbon blenders. » » » The P-K Pre-Test Laboratory provides accurate predictions on savings, scale-up and operational procedures. We invite you to take full advantage of its facilities—either by bringing or sending your materials. To make arrangements, write or call George Sweitzer at East Stroudsburg. To call direct dial 717-Hamilton 1-7500. » » » A new P-K Solids-Process Catalog #16-P is now available.

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Customers' orders flowing through Columbia-Southern's Order and Service Department, directed by Paul McHail, are routed without delay to the appropriate shipping point by means of a modern, direct communications network. During their brief passage through the Department, they are checked against customers' standing specifications and given complete routing instructions by representatives of the Traffic Department. The central location of Order and Service at Columbia-Southern's Pittsburgh Headquarters provides close contact with product managers and others, making fast decisions an everyday reality.

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Draw one... rigid?

This is a story about FOAMS... urethane foams

EVERYONE KNOWS you can control the amount of foam on a stein of beer . . . that's easy. Controlling the action of poured urethane foam materials is also easily mastered.

But to spray foam on smooth or irregular surfaces on a commercial basis . . . that was another problem — a real problem.

So, while we were pioneering in polyether-based urethane foams, we had our business eye cocked for means of spray applying it. We discovered that a leading maker of spray-painting equipment was already alert to the great potential of urethane foams, and was more than anxious to cooperate.

Result: Solvent-blown polyether urethane spray foams became a reality. Standard, portable hot-spray catalyst equipment, which is readily available, makes the application of these new foams just as commercially practical as spraying paint.

Wherever you wish to apply urethane foams — for thermal insulation or sound dampening in freezers, refrigerators, industrial tanks and surfaces . . . in air-conditioning cabinets, ducts, or as a reinforcement for thin-gauge metal sections of aircraft and automobiles . . . or for corrosion control in industrial plants—you'll find the equipment and raw materials easily obtainable, and the results predictable.

For, it all goes back to the proved Wyandotte system: that when polyurethane components are simultaneously mixed and atomized in an air blast, foaming action takes place. This action begins immediately, even before the mass strikes the surface, and is completed in a matter of minutes.

Can you see the possibilities for profit? More than 1400 other firms and individuals have (according to inquiries received). But perhaps you're wondering, "How do I go about it to get the best results?" This will assist you:

1. If you are a prepolymer manufacturer, or are making foams for others, keep in close contact with our market-development and new-products departments.

2. If you have need for urethane foam to be applied in your plant, get in touch with a prepolymer maker or foam applicator.

3. If you make, or wish to make, urethane foams as a part of your own products or processing, write us direct, describing your requirements in as much detail as possible. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

Wyandotte's urethane-foam raw materials include: PLURACOL® Series of Triols, used for one-shot flexible foams and for the preparation of rigid urethane foams; PLURACOL Diols used for prepolymer-type flexible foams and to impart strength properties to one-shot flexible foams; TETRONIC® Polyols, for improved resilience and moldability; QUADROL®, a very reactive cross-linking agent and catalyst; DHP-MP, a catalyst with extremely low odor.

Wyandotte CHEMICALS

MICHIGAN ALKALI DIVISION

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Technology
Newsletter

CHEMICAL WEEK
August 13, 1960

Economic feasibility of a new acrolein plant is being studied by Standard Oil Co. (Ohio). Key: a new Sohio process, in the pilot plant since January, that catalytically converts propylene into acrolein at "costs substantially less than by other methods," according to Research Manager Everett Hughes. The process uses a special bismuth-phosphorus-molybdenum catalyst, described as one-fifth as expensive as those commercially used in acrolein production. Sohio—also looking into the possibility of licensing its process—believes sharp reductions in the price of scores of products, including plastics, paint, etc., would result from cheaper acrolein. Similar thinking is behind Shell Chemical Corp.'s new acrolein plant at Norco, La., and the recent flurry of research in acrolein derivatives by Shell, Union Carbide, and others (*CW, Nov. 28, '59, p. 77*).

Sohio production of acrolein from propylene and ammonia is described in Belgian patent application 568,481 (*CW Technology Newsletters May 30, '59, and June 20, '59*).

•

Dichlorocarbene (CCl_2) is now under study in Germany for possible use in synthesizing insecticides and perfume ingredients. The compound, once considered nonexistent, has been prepared by Prof. M. Schmeisser of Aachen Technical University (Institute of Inorganic Chemistry and Electrochemistry). Carbon tetrachloride vapors at 1300 C are passed over carbon in a corundum tube, reportedly yielding 30 grams of CCl_2 per 3 grams of carbon. The reaction product is cooled first with water, then with solid carbon dioxide, finally with liquid air. It is a yellowish substance, melts at —114 C and boils at —20C. With butadienes, the compound forms cyclopropane derivatives having insecticidal properties.

•

Another polystyrene foam competitor for paper has been developed—this one by Dyna-Foam Corp. (Ellenville, N.Y.). Like Monsanto's Santofome (*CW Technology Newsletter, Aug. 6*), the newcomer, called Dyna-Foam, is competitively priced. It reportedy has applications ranging from picnic plates, cups and bowls, to insulating materials and food packaging. Widths up to 60 in. are available.

•

Economic recovery of germanium from coal fly-ash will be investigated by the Bureau of Mines at Rolla, Mo., and Bartlesville, Okla., in fiscal '61. Growing U.S. dependence on foreign sources for the metal and swelling demand for it in transistors, diodes, etc., are behind the move. Currently obtained solely as a by-product of base-metal (e.g., lead) processing in the U.S., germanium has defied industry efforts to extract it commercially from coal.

•

Two new frozen dessert polyoxyethylene emulsifiers have gained Food & Drug Administration approval. Called Tween 65 and Tween 80,

they were developed by Atlas Powder Co. (Wilmington, Del.), reflect recently accelerated industry-wide emulsifier research resulting from sharply increasing demand for ice cream and similar products. Atlas is also seeking FDA acceptance of the new compounds in other food uses.

•

Organic phosphate pesticides are creating an increasingly important health problem, according to a new report by a California state department of health (Berkeley) research team. A study of occupational disease reports in cases stemming from agricultural chemical agents noted a rising number of patients between '51 and '57, when 749 cases were reported in the state. Nearly a third of the '57 cases were attributed to organic phosphate pesticides. One reason: "Since many workers find the concept of poisoning through the skin hard to understand, workers often fail to wear protective clothing when applying such chemicals, and to wash themselves thoroughly afterwards."

•

A new route to synthetic rubbers is claimed by a Stamford, Conn., engineering firm, Crawford & Russel, Inc., which has developed the process through the pilot-plant stage. The new method is based on an elastomer-solvent system, bypasses crumb-type coagulation of conventional emulsion processes. The process starts with an elastomer-solvent mix (containing 20% solids). Solvent is stripped by extruding the thick cementlike solution over a bed of water at 200 F; meanwhile, the strings of elastomer combine to form a continuous sheet. In a second pass, the sheet is completely desolventized under hot water and dried in a low-cost dryer. The dried product is tacky enough to be easily baled for shipment to molders.

Advantages claimed for the process: Investment savings of about $500,000 on a plant rated at 30,000 lbs./year; operating costs reduced ¼ to ½¢/lb.; and clean, continuous, easily controlled operation.

•

Plastic coatings that resist temperatures up to 400 F and can be applied as liquids at room temperature are said to be possible with a new group of resins developed by Delka Research Corp. (Glen Rock, N. J.). The resins are polypropylene or polyethylene cross-linked with urethane, epoxy, alkyd, vinyl or other resin and dissolved in a special solvent that evaporates in two to four hours, leaving a hard finish (up to a Shore A hardness of 45-55).

If the surface to be covered is clean, Delka claims, the new coatings need neither a primer nor a catalytic drying agent. They have already been used as waterproofiing and vessel liners, are reported to have good resistance to solvents such as toluene and acetone, as well as 5-25% sodium hydroxide, 30% hydrochloric acid and 25% sulfuric acid, although they break down under 93% sulfuric acid.

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The non-mar qualities of corrugated board used for furniture packing are substantially improved by treating the board with a special blend containing PANAREZ Resin. Tests demonstrate the mar-resistant superiority of this blend over straight wax or wax-polyethylene blends.

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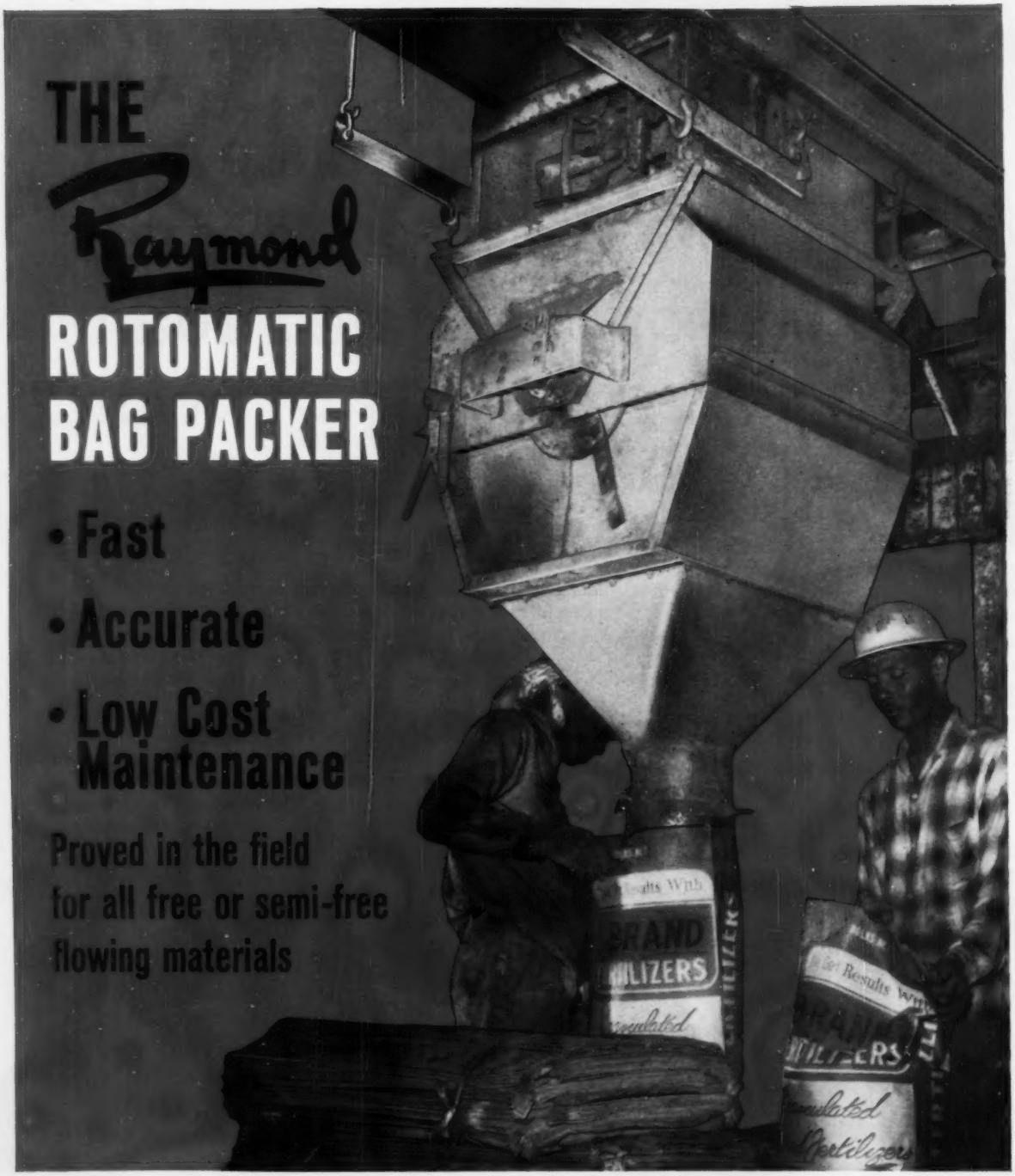

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New Output Data Put Growth Patterns Into Fresh Focus

The Bureau of Labor Statistics this week is adding more statistics to an already sizable pile of information about a much-discussed, but little-understood topic: productivity. The figures give some segments of the chemical process industries a clearer picture of their own productivity growth.

The Bureau's annual worker output index compilation this year covers 22 industries, including several of importance in the process industries (*see graph*) as well as those of such basic significance as steel and railroads*. This year, for the first time, data has been expanded to include information other than simple productivity figures, such as industry production, employment, labor requirements per unit of production, and output per employee—not just per production worker.

Clue to Use: BLS cautions against using the new productivity indexes to reach any broad, general conclusions about the economy as a whole. But they do provide a picture of shifts within the economy to new industries or new products and some hints about how such factors as automation affect specific industries.

Chemical process industries have been among the chief beneficiaries in productivity gains. This is illustrated by the figures on synthetic fibers, the star performer of the 22 industries covered by BLS.

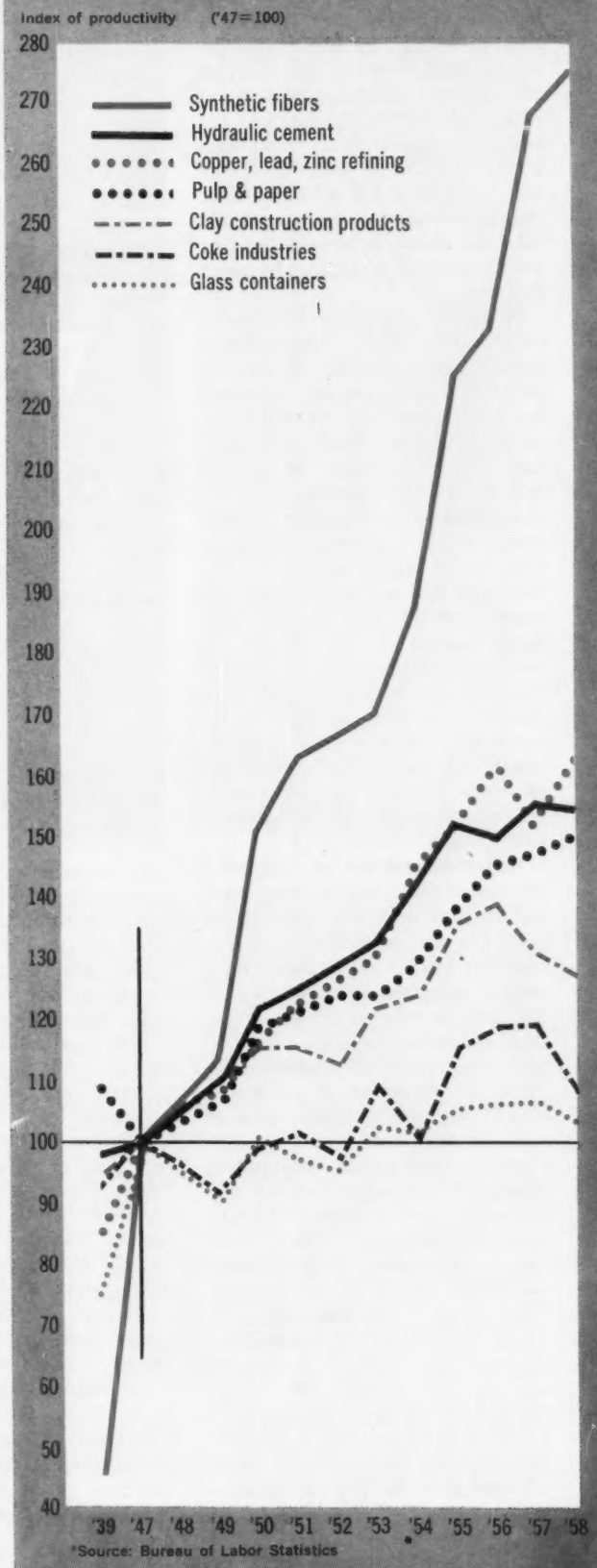
It shows a spectacular index of output per production worker man-hour of 274.6 for '58—the last available year—compared with 45.3 for '39 ('47 = 100 for all index figures). By contrast, glass container manufacture, at 77.2 in '39, has dawdled along since '47 with little or no change in productivity. Industry people account for this by the fact that the glass container business has been heavily mechanized for many years.

The synthetic fiber performance typifies a new industry which has learned new production techniques and has developed efficient manufacturing methods. In addition, as is obvious, it's an industry particularly susceptible to automation because it produces huge quantities of materials in heavily mechanized operations.

Other Industries: Of general interest is the pulp and

* Some others, in addition to those shown on the chart: metals and coal mining, railroad transportation, telegraph communication, tobacco products, canning, confectionery, flour and grain mill products.

New Look at Productivity's Rising Curve



*Source: Bureau of Labor Statistics

paper industry because, BLS economists say, it is one that is holding close to what they think is a national average for productivity increases. BLS is now doing a study on the impact of automation on pulp and paper. Productivity in this field has been rising steadily since '47, although it decreased over the years between '39 and '47— probably as a result of obsolescent plants and processes that since the war have been replaced or overshadowed in importance by newer facilities.

A category representing industries very much in a state of flux is coke industries (including coke by-products). Its output per production man-hour has varied from an index of 92 in '49 to a high of 119.4 in '57. BLS says that it's becoming increasingly difficult to reach accurate statistical conclusions about the coke industry since steel companies are producing more and more of their own coke. One economist for a large coke producer, however, said that the BLS figures parallel his own industry calculations. Another factor affecting the relatively low increase in coke productivity: coke makers are not able to automate as much as other manufacturers with more recently developed processes. BLS will soon begin combining coke statistics with those of the steel industry.

How these statistics are interpreted depends on who's talking about them. But all who use them are quick to point out that productivity is a concept that has yet to be defined in a manner acceptable to all who use it. To some it may mean—as in the BLS statistics—a measure of output per unit or period of production. To others it may mean corporate efficiency, measured in dollar value of sales per employee.

Among labor leaders, for example, productivity is largely equated with automation. Nat Goldfinger, AFL-CIO economist, complains, "Much of the increase has resulted not in increased production, but rather in increased displacement of the labor force, and rising unemployment." Echoing this are the major unions in the chemical industry: Oil, Chemical & Atomic Workers and the International Chemical Workers Union. Indeed, the latter has predicted that sometime during the decade of the '60s automation—or productivity—will result in there being as many white-collar as blue-collar workers as the latter become displaced. Both unions, incidentally, have felt the impact of increased productivity. OCAW, which listed 183,000 members and 620 locals in '57, last year listed 180,175 members and 577 locals. ICWU has slipped from 84,299 and 410 locals to 81,144 and 407 locals during the two-year period.

Management is Cautious: Chemical management men are cautious about the new BLS productivity figures. The view of many was summed up by the view of a top officer of one large company: "Neither we nor the Bureau of Labor Statistics can measure productivity, particularly in multiple-product areas."

Nevertheless, he said, his company is trying to figure out some way to compute indexes of production per employee. Checks with other chemical makers indicate that most don't keep comprehensive figures on productivity —partly because of the magnitude of the job in large firms, partly because of the difficulty in pinning down the meaning of the figures once they have been compiled.

Many managers believe that difficulty in pinning down figures shouldn't preclude efforts to do so. In one large synthetic fiber manufacturing company, in fact, fairly extensive figures are kept on productivity, primarily on a product-by-product basis. From studies of its productivity gains this company finds that about half come from technological changes—e.g., in process or equipment—while the remainder stem from improved methods—e.g., better ways of deploying the labor force.

This company looks on the BLS synthetic fibers figures with some skepticism, feels they ignore the importance of differentiating between improvements in existing plants and the built-in high productivity of new plants. They fail to show, in other words, internal industry changes producing the over-all patterns.

Despite the skepticism, however, many companies use the figures as guides, both in measuring standards of performance and in gauging manpower needs for new plants. As at least two economists pointed out, "They may be hazy and difficult to interpret wisely, but we use them—after all, they're all we've got."

New Pollution Help

A new service started up last week that is designed to help chemical plants east of the Rockies control air pollution by foreknowledge of weather conditions.

The Research Station at the U.S. Public Health Service's Robert A. Taft Sanitary Engineering Center (Cincinnati, O.) began predicting prolonged periods of "high air pollution potential."

The service will be conducted through the fall months primarily for air pollution control and research units, will operate through local weather bureaus. Individual companies and groups that want to be kept abreast of pollution potential can make arrangements with their local weather bureaus to be notified when meteorological conditions indicate heavier air pollution than usual.

The forecasts from Cincinnati will be sent to an area only when "high pollution potential" is expected. High potential, says the Center, occurs when low wind velocity—under 9 m.p.h. —results in "stagnant air." The Research Station receives its information from the National Air Sampling Network. For the past two years—during the fall season—the station has monitored weather conditions and pollution, until now hasn't disseminated its forecasts.

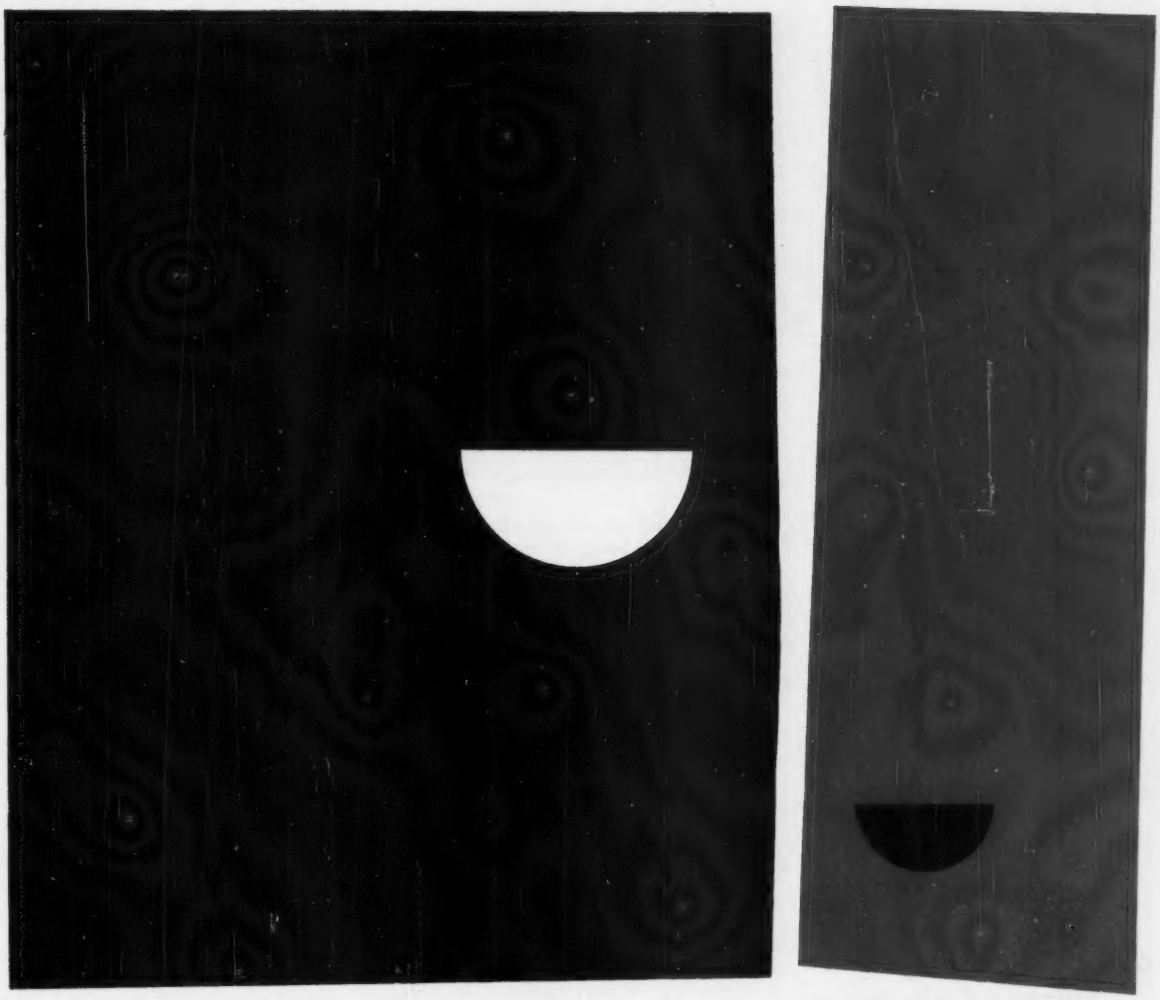
Although the Research Station is making little direct contact with industry, a meteorologist there says that several process plants have already contacted him for information.

Interested companies, the Center says, should contact their nearest weather bureau for details.

Industrywide Training

The American Pharmaceutical Manufacturers Assn. this week is sounding out members of its international section on the possibility of setting up a coordinated training program for employees being sent overseas. If plans go through, the association would be the first group within the chemical process industries to attack the problem of overseas training on an industry-wide basis.

The program would probably begin as an information exchange on ways to help prepare employees for overseas work and on ideas about train-



Looking toward tomorrow, visualizing the shapes and courses it will take, anticipating its needs . . . this search for ways to serve industry better and more fully has been an unremitting spur to Sonneborn, since many tomorrows ago. Inasmuch as this quest dates back to the turn of the century and has been concentrated upon a specialized segment of petroleum refining, it is not surprising that in products, technical assistance, service, Sonneborn Goes Further.

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ing foreign nationals employed by the manufacturers, the association says. But officials say it could grow into a more formal seminar.

The aim would be to orient workers and their families for overseas assignments and give drug makers an opportunity to improve methods for evaluating overseas personnel.

Vitro Suit Settled

A federal judge in Cleveland, O., has awarded damages of $367,192 to the Hall Chemical Co. as judgment in its case against Vitro Corp. of America. Hall was awarded the sum last week after a court-appointed master had established the amount. The establishment of the award follows the verdict of three years ago that Vitro had used a patented process of Hall's in violation of a contract between the two firms. Counsel for Vitro indicates the company will appeal the amount of the award.

LABOR

Vote Void: In one of the first actions taken in the chemical process industries under the Landrum-Griffin Labor Act, Secretary of Labor James Mitchell seeks to void the election of officers of the Independent Petroleum Workers Union representing employees at Esso's giant Bayway, N.J., refinery. Union rank and file, who asked Mitchell to take action, are dissatisfied with the choice of officers who attempted, earlier this year prior to a representation election, to swing the independent into the Teamsters Union. Mitchell's complaint says that procedures of the law with respect to handling of ballots had not been properly followed. If a U.S. District Court agrees with the allegations, a new election will be held. IPWA won representation rights last February by a narrow margin over the Oil, Chemical & Atomic Workers.

•

Allied Agreement: Local 12-572, District 50, United Mine Workers, closing out an 11-day strike at Allied Chemical's Semet Solvay division plant at Tonawanda, N.Y., has ratified a two-year labor contract providing for a 12½¢/hour wage increase in the first year and an 8¢ increase in the second year. The new pact—approved by a vote of 202-16—also calls for improved medical, hospital benefits for the 350 production and maintenance workers affected.

•

Rubber Push: Locals of the United Rubber Workers are voting now on whether to ratify agreements just negotiated with the "big four" rubber companies—Firestone Tire & Rubber, Goodyear Tire & Rubber, U. S. Rubber, B. F. Goodrich.

Agreements call for a general wage increase of 9½¢/hour with additional hikes for skilled workers. A total of some 76,000 employees are affected.

Meanwhile, URW is considering new means of strengthening striking power. A major proposal due for discussion at the union's annual convention in September calls for union strike benefits to be paid to all strikers as a matter of right, rather than on the basis of individual need.

KEY CHANGES

George McClellan Joyce to president, Dyna-Therm Chemical Co. (Culver City, Calif.).

J. D. Stetson Coleman to board of directors, Universal Oil Products Co. (Des Plaines, Ill.).

George P. MacNichol, Jr. to board of directors, The Goodyear Tire & Rubber Co. (Akron, O.).

Hugh Knowlton and **Graham B. Blaine** to board of directors, Harvey Aluminum (Torrance, Calif.).

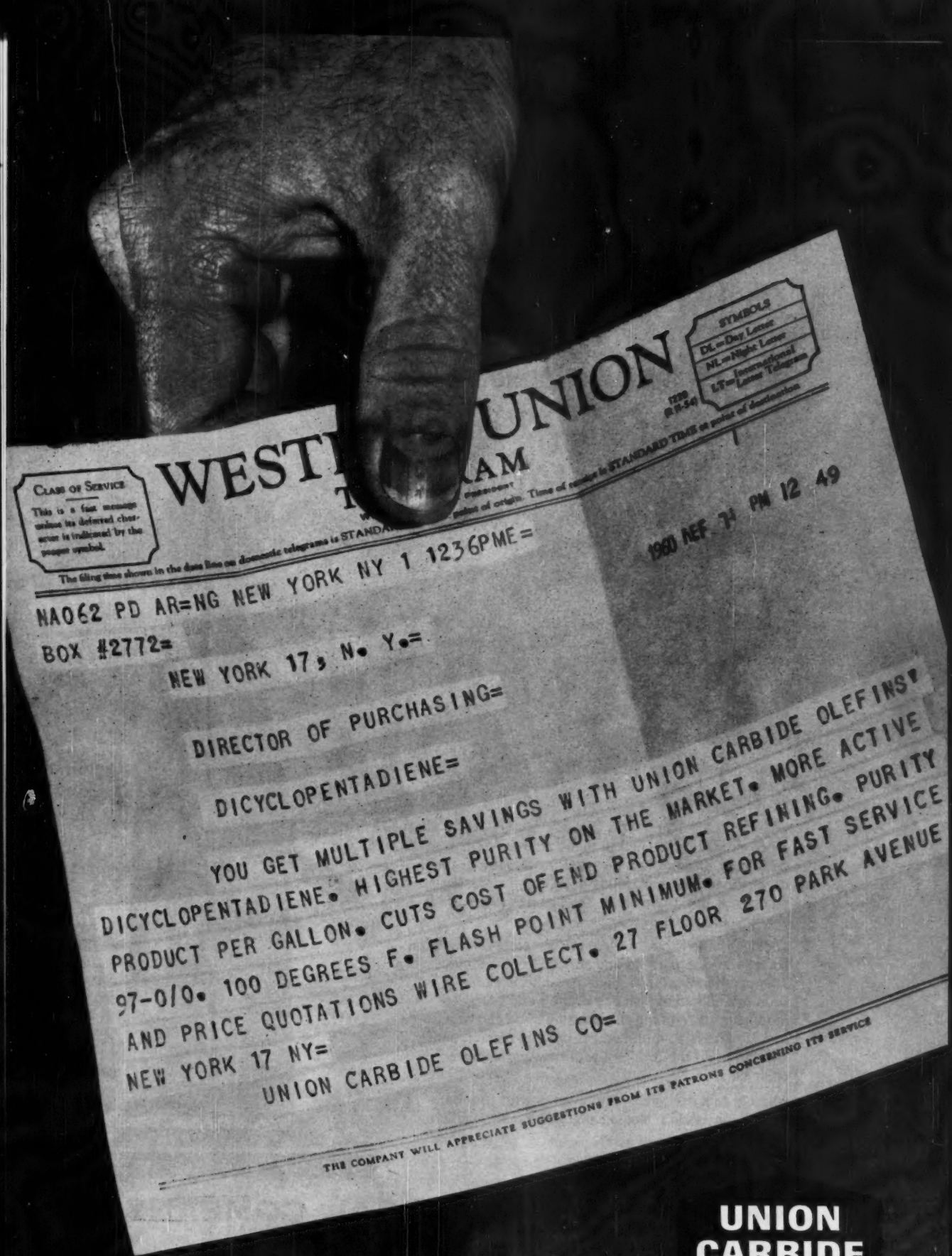
John C. Douglas to vice-president, operations, **David Swan** to vice-president, technology, Union Carbide Metals Co., division of Union Carbide Corp. (New York).

Norman E. Hathaway to executive vice-president, Nitrogen Division, Allied Chemical Co. (New York).

William R. Moffitt to senior vice-president, manufacturing and engineering, **Samuel Loshaek** to director, product development, The Borden Chemical Co., division of The Borden Co. (New York).

Robert W. Reinicke to vice-president, operations, Ansul Chemical Co. (Marinette, Wis.).

Richard M. McGhee to vice-president, engineering, Petro-Tex Chemical Corp. (Houston, Tex.).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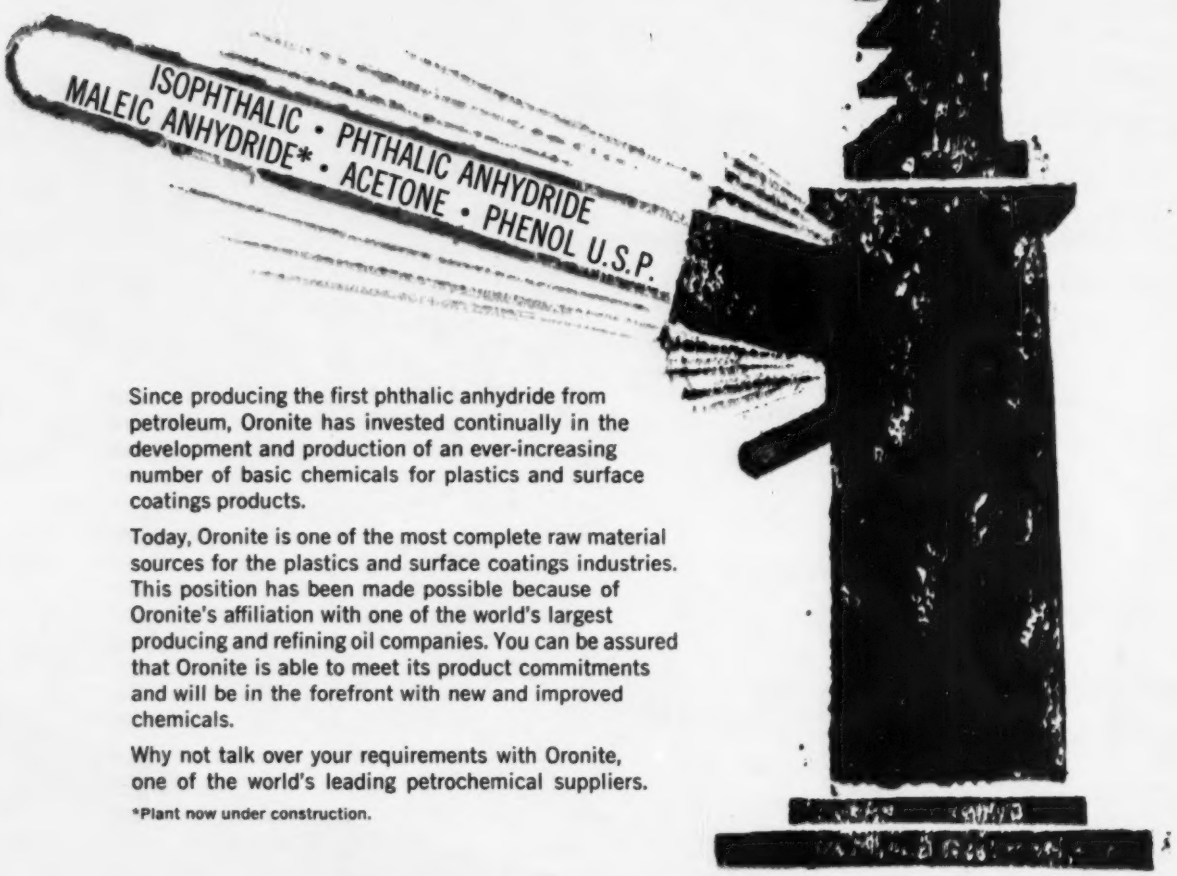

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Electrically operated valves must clear cost hurdle to gain acceptance in automatic process control.

Electric Systems Vie for Valve Service

If valves like those shown above were made part of an automatic process control system today, the chances are they would be opened and closed pneumatically. But research now in progress by many control equipment makers is aimed at developing better electric valve actuators that may swing the choice over to electric operation before another year is out. It could simplify electronic control at lower cost and pave the way for direct computer control.

"What's needed is a new type of electro-mechanical muscle," says Robert F. Wall of Monsanto Chemical's Texas City plant. Instrument engineers at many plants back his comment by pointing out that electric (electro-mechanical) valve actuators cost two to three times that of pneumatics and don't provide versatile, flexible performance needed.

At existing plant sites where an air supply is already handy, electronic controls may be used up to the valve; the instrument engineer's choice of pneumatic valve actuators is a foregone conclusion. And now, even in new plants where installation of electronic controls and a complete electric system could eliminate the compressors, drier and distribution system needed for an air system, air is still added for valve control.

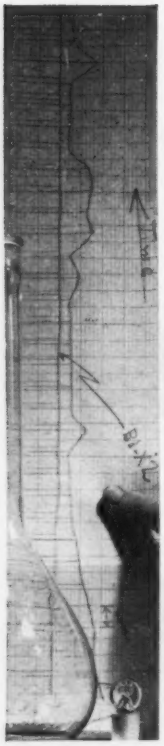
No Comparison: Cost and performance are tied together—complicated because the entire system, rather than just the valve actuator, must be considered. "Starting from scratch, we could come up with an electronic control system that would cost about the same as a pneumatic one. But there would be no way to compare them on a performance basis. The electronic system, minus the electrically actuated valve, would give quicker control response; the pneumatically actuated valve would operate with greater speed and force," says one instrument engineer.

"We could give comparable response in an electric valve, but not at comparable cost," says Fischer & Porter's Joseph Wapner.

Some control equipment makers believe they can woo the chemical industry's instrument engineers with an electric actuator that costs 50% more than a pneumatic. Others feel there will be few sales unless the cost can be brought to within 10-15% of the pneumatic; one company says its goal is no more than 5% higher cost.

Most admit that they don't know what the design answer is right now, but they are confident that it will be found soon.

"A lot of engineers have been working on the problem for the last



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CW PHOTO—ED WALLOWITCH

Repairs too are more costly and complex with electrical valves.

three to four years, and a solution is bound to come" says one control maker. He points out that once computer control really moves into processing, a good electric actuator is a must. Chemical industry instrument engineers aren't quite as definite.

For example, U. S. Industrial Chemical's Vince Riggio says, "Until the computer is the complete control system itself and sends out its own corrective signals, we won't be interested in integrating the actual control valve into the control system. We can come out or go into a control system and computer with electric signals, convert to pneumatic at the valve. There is no real need for electric valve actuators until the computer puts out the primary electric control impulse instead of a signal that is put through intermediate units."

One sign of what is to come: Fischer & Porter has developed a prototype actuator that will respond to the analog signals of conventional instrumentation or the digital pulses from computers. The unit, however, isn't ready for process application yet. The company is trying to get cost down before it goes to market. And, it's doubtful that first applications will be digital.

One-System Advantages: Most engineers agree, however, that even if there is no urgent need to use a signal directly from a computer, there are definite advantages in having a single control system rather than in switching to a second system at the valve. For example, hydraulic valves have somewhat better performance characteristics than pneumatics. But the actuator cost is about 1½ times that of pneumatics and a separate hydraulic system is needed for each valve. Most engineers feel the performance pluses are not worth the cost and the problems of maintaining many separate systems.

Electronic control systems have the advantage over pneumatics in qui k response over extended distances (*CW, Oct. 19, '57, p. 61*). But instrument engineers still prefer the other performance advantages of the pneumatic system for valve operation. Pneumatic valves generally have low-inertia mechanical systems that enable delivery of high power in short periods of time—a requirement for fast response.

High power and low inertia are contradictory terms for most electric motors. The point that may not be to the electric actuator's disadvantage: most process requirements aren't too severe. It certainly isn't a problem in the power industry, which has been supplied with electric valve actuators by firms like Leeds & Northrup for a number of years. In many power-plant applications, the valves

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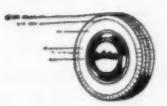

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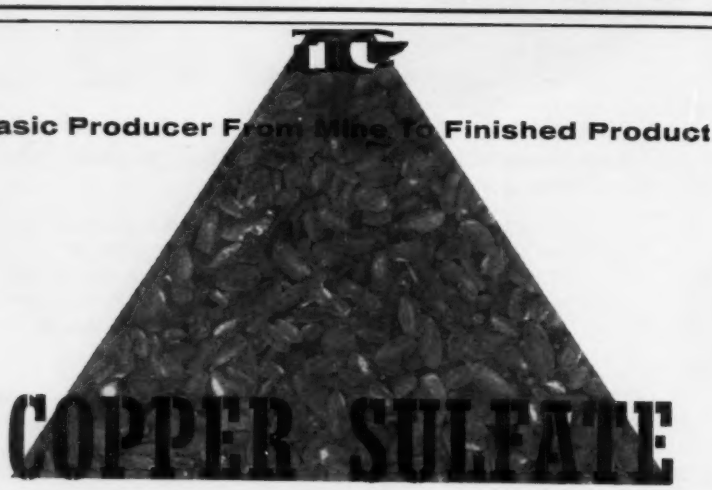

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are opened and closed infrequently and speed is not a problem.

L&N (like Conoflow, General Controls and Norwood Controls—the others now marketing electric actuators) uses a low-inertia reversing motor to drive the actuator stem. The input signal is small, must be amplified for use. And the motors transmit their power through a gear reduction train.

One control equipment maker points out that if an inexpensive ¼-hp. motor could be found (currently used motors are much smaller), the electric actuator's power performance could be improved. Swartwout's vapor system valve positioner (*CW, Oct. 18, '58, p. 90*) suffers from the same low-force problem. Rockwell's Republic Flow Meters subsidiary has a bloom valve for supplying fuel oil to open hearths in steel mills that uses the oil flowing through the valve to boost opening and closing power.

But plant instrument engineers worry about other things than power. Most electric actuators operate at constant speed. Both speed and power of pneumatics can be changed by changing air pressure.

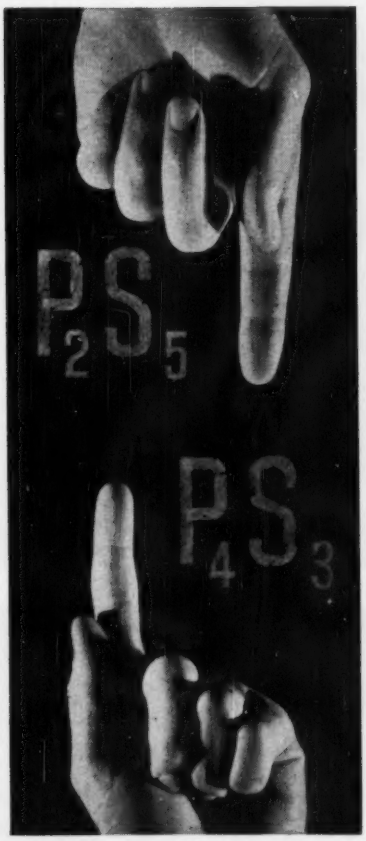
Extra Problems: Most instrument men say the additional weight and cumbersome explosionproof housing needed to protect the contacts may prevent the all-electric valve from being mounted on a pipe without greater support than is needed for other actuators. Solid-state systems, which don't need explosionproof housings, may overcome this hurdle. And one control maker feels they may lead to variable-speed control of the valve. So far Foxboro is the only firm that has come out with solid-state controllers, and these have not been in service long enough to provide conclusive performance data.

But solid-state equipment will suffer from the same problem as electronic—lack of parts standardization. In pneumatic systems it is possible to interchange parts, use as many as a half-dozen different suppliers' equipment. Users of electronic controls are still wed to a single supplier.

Clearly, electric control valves appear to be facing an uncertain start But a combination of lower cost and better performance will help them get ready for the day when computer control wins its spurs.

BRIEFS

phosphorus sulfides
sulfuryl chloride
muriatic acid



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According to the Encyclopedia of Chemical Technology, only four of the 14 phosphorus-sulfur compositions are true chemical entities. We offer two of them: phosphorus sesquisulfide (P_4S_3) and phosphorus pentasulfide (P_2S_5). Both have wide use as reagents in organic synthesis. We provide the pentasulfide as a grey-yellow material fused solid or as a powder in three mesh sizes. It has a typical melting point of 278°C. Our phosphorus sesquisulfide is a lemon-yellow powder with a typical melting point of 171°C. It contains no free phosphorus. Write for complete data sheets on both.

WHAT THEY SAID IN 1944

A technical paper in the September, 1944 issue of *Industrial and Engineering Chemistry* predicted great things for a relative newcomer on the reagent scene, Hooker sulfuryl chloride. It said:

"Sulfuryl chloride is a versatile reagent with great potentialities in organic synthesis. Under appropriate conditions it may be used for the chlorination and sulfonation of both aliphatic and aromatic derivatives. It may also be applied as an acylating and condensing agent. The simplicity of these reactions, their ease of control and their high yields promise to make the reagent particularly useful in many applications which require simple and unspecialized equipment."

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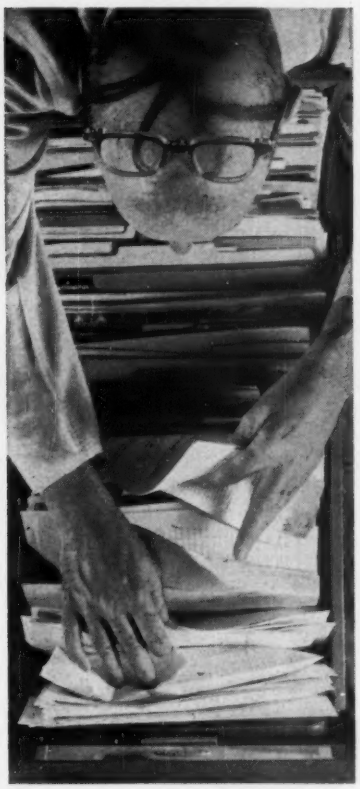

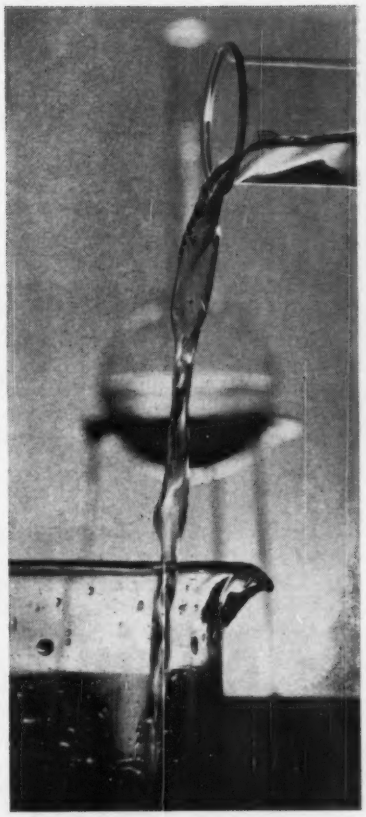

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- ☐ Muriatic acid, data sheet
- ☐ Sulfuryl chloride, reprint and data sheet

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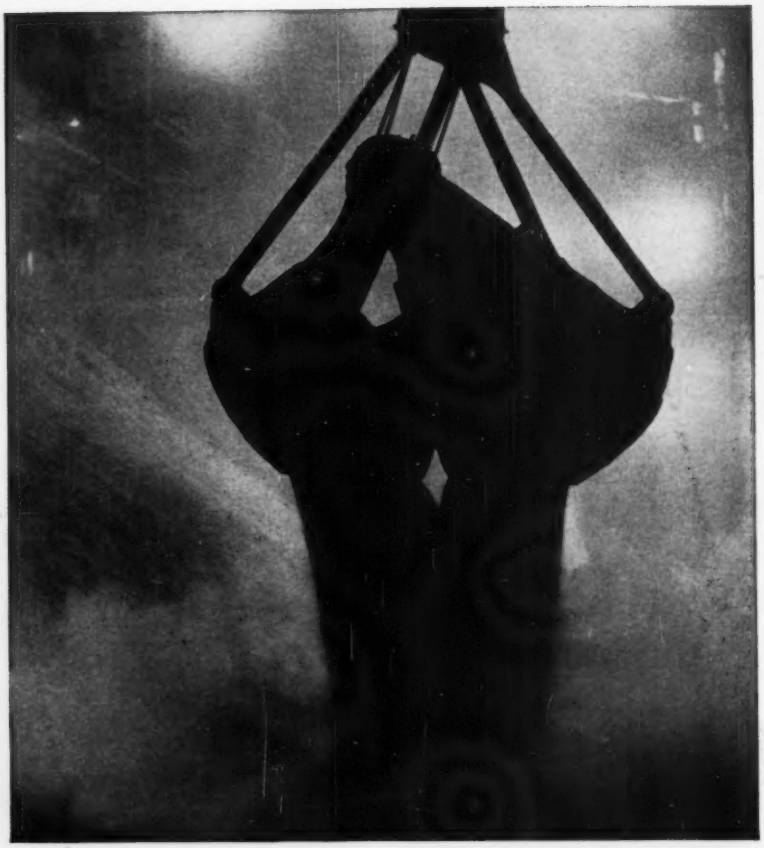
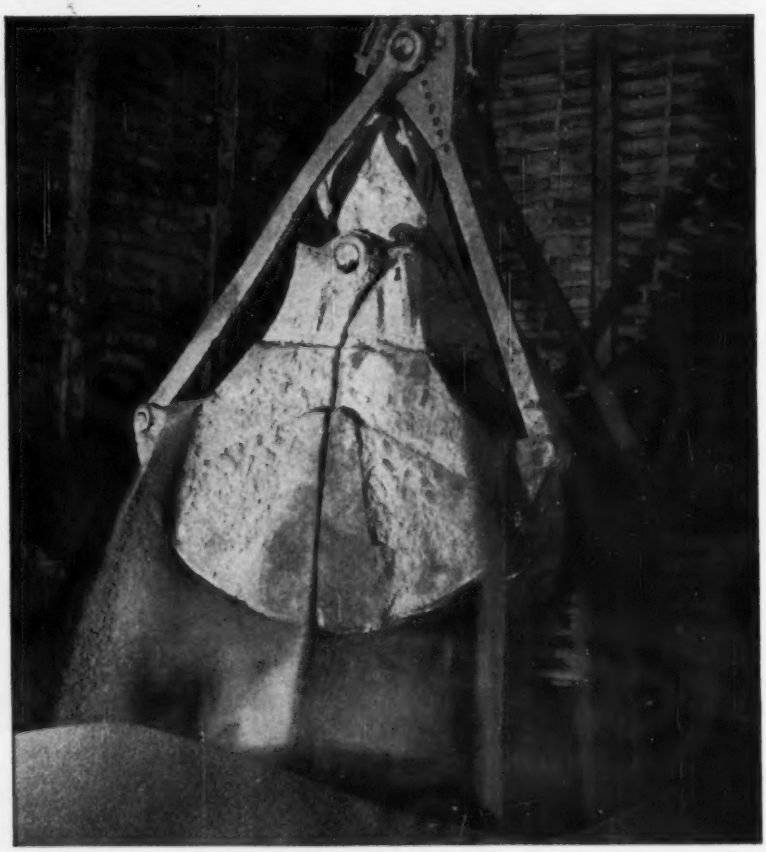
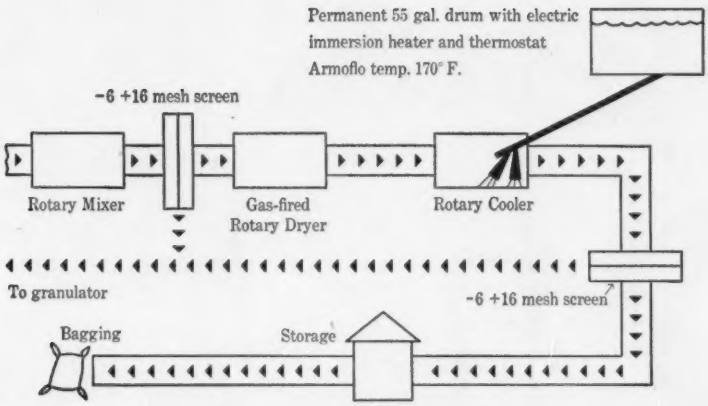
New cure for caking and dust problems: Armoflo 65







Dust is a common problem to all fertilizer manufacturers.

Now the Armour *Industrial* Chemical Company offers an effective solution with Armoflo 65 and other Armoflo formulations. Originally developed as cationic anti-caking agents for hygroscopic materials, these compounds display excellent dust control as well. The Jeffersonville, Indiana, plant of the Armour *Agricultural* Chemical Company has just completed the first season of production using Armoflo 65. W. C. Brodfuehrer, Plant Superintendent, summed up by observing, "I'd say there was an overall improvement of about 75%."

Results in Jeffersonville also show that caking is no longer a problem. To use the Armoflo formulations most effectively, personnel at Jeffersonville made minor revisions in the plant layout as illustrated in the flow diagram above and explained in the accompanying description.

Trade Name	MP°C Average	Recommended Anti-Caking Uses
Armoflo 65* (Cationic)	5°	• Hygroscopic Fertilizers and Salts • Sulfur • Thermosetting Plastics
Armoflo 66 (Cationic) (*New*)	34°	• Highly Hygroscopic Salts and Fertilizers
Armoflo 48* (*Anionic*) (*New*)	−3°	• Hygroscopic Sodium and Calcium Salts

*Also recommended for dust control

General Recommendations

Armoflos are preferably applied warm to hot—dripped, sprayed, or fogged—to materials in the range 100-250° F. Thorough mixing should follow, preferably in rolling equipment, to secure the hydrophobic monomolecular Armoflo layer which imparts protection against caking and to which fine dust particles adhere. Method of addition, for these Armoflos, is *as received*.

Plant Operation

Armour Agricultural Chemical Company
Jeffersonville, Indiana

The fertilizer base goods are fed into the granulation plant where they are intimately treated with water and liquid reactants. Screening is done next to avoid recoating the circulating load. The reaction mixture is then dried in a gas fired rotary dryer, and passed to a counter-current rotary cooler. The Armoflo, at 1#/T, is sprayed into the cooler through 2 nozzles at the point of air intake. Both sufficient heat to hold the Armoflo in a fluid, mobile state and proper mixing to insure thorough and complete spreading of the Armoflo are available at this point. The dryer exit or cooler entrance also would be satisfactory points of addition on the basis of these temperature and mix characteristics. The cooled fertilizer is screened to eliminate the undersize caused by attrition, and then the product is bagged for shipment.

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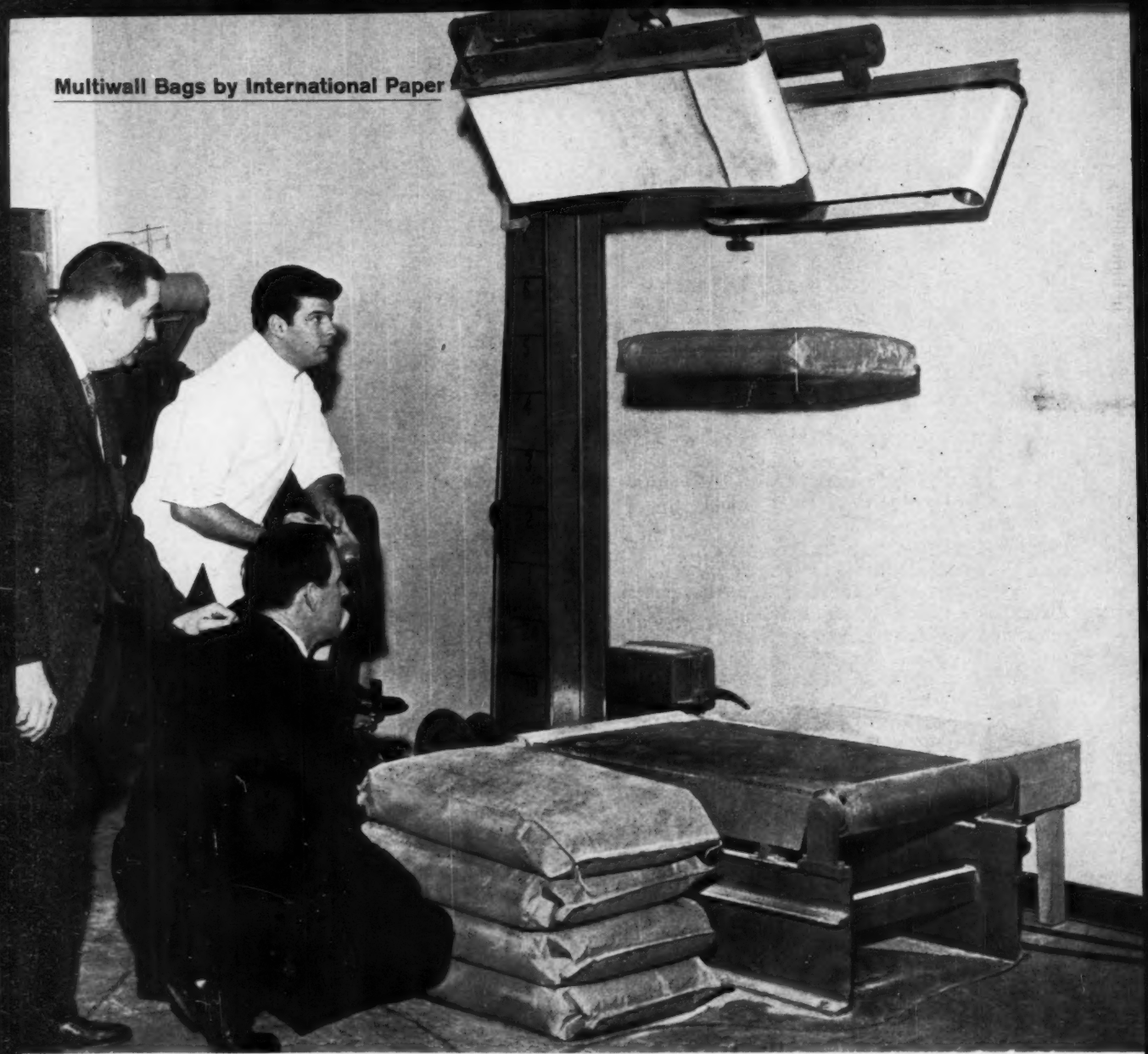

Multiwall bag undergoes drop test at new Camden lab.

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Market Newsletter

CHEMICAL WEEK
August 13, 1960

Word of new U.S. acrylonitrile-butadiene-styrene resin capacity won't hit the trade officially until early next week, but here's an advance note: Goodrich Chemical is starting commercial production of ABS resin and a series of compounds (tradenamed Abson) at its Akron, O. plant.

Although the company will not reveal the size of the new installation, it's a good bet that productive potential will be in the 5-10-million-lbs./-year range, considering the estimated size (some 30-35 million lbs. in '60) of the extrusion, vacuum-forming and molding market for such products.

The ABS field in the U.S. has been dominated for some time by Marbon Chemical (Borg-Warner) and the Naugatuck Division of U.S. Rubber (*CW, July 20, '57, p. 94*). Goodrich, however, has been quietly marketing pilot-plant quantities of its product as "Good-rite polyblend", the past year and a half.

Another ABS entrant? Perhaps. There's some trade talk that Monsanto will put up a 30-million-lbs./year acrylonitrile-butadiene-styrene resin plant for operation by mid-'61. Probable basis for speculation: recent Monsanto announcements that it would expand styrene monomer capacity to about 600 million lbs./year by '62; ABS would be one likely captive outlet.

A Monsanto spokesman told CHEMICAL WEEK there were no definite plans for an ABS plant but that the company can be expected to expand its styrene product line. One example: it's new food-packaging film made from polystyrene foam (*CW Technology Newsletter, Aug. 6.*)

Meanwhile, you will hear more about styrene-acrylonitrile copolymers. Dow Chemical is developing experimental resins based on modification of its established product Tyril. Says Dow: These modified resins will probably have different properties than the generally known ABS resins.

The firm has been turning out the Tyril resins (formerly called Styrex), at Midland, Mich., and it's likely the modified products will also be made there.

•

Calcium carbide production has just started at Union Carbide Metals' Sheffield, Ala., plant. As spelled out earlier this year (*CW, Acetylene Report, March 26, p. 52*), Union Carbide converted an idle ferro-alloy unit to produce calcium carbide that will be shipped to the company's Memphis, Tenn., plant. There the material will be used in generating acetylene destined, via pipeline, for Du Pont's new acetylene-hydrogen cyanide-acrylonitrile plant.

The Sheffield carbide capacity is approximately 60,000 tons/-year, enough to turn out some 40 million lbs. of acetylene annually. Al-

though Du Pont has never confirmed reports on the size of its Memphis acrylonitrile plant—it was generally believed to be 25-30 million lbs./year—the amount of acetylene Union Carbide could ship over would indicate an acrylo capacity of over 50 million lbs./year.

•

Nylon tire-cord makers are in a dither this week. Reason? Last week's surprise price cut in rayon tire cord. A 2½¢/lb. reduction was initiated by Industrial Rayon, with the lower price to apply only to August shipments. But a few days later, Beaunit Mills, in following the price drop, said it would extend it beyond August. Other rayon producers are expected to do the same.

At press time, the major nylon makers (Du Pont, Chemstrand, Allied) were still "evaluating" the situation. Says one: no one can predict, at this time, what our course will be.

What has upset the nylon makers is that this cut in tire-cord prices was initiated by rayon makers, and comes only eight months after a hot price battle that lopped 7-9¢/lb. off nylon and 8-9¢/lb. off popular rayon denier yarns (*CW, Market Newsletter, Jan. 2*).

•

U.S. synthetic rubber exports to Japan will be crimped by a Japanese government decision to use GATT emergency provisions to lift import barriers, help the 40%-government-owned Japan Synthetic Rubber Co. out of a tight marketing situation. JSR can't meet prices of imported SBR (mostly U.S.) which is just about filling the country's 5,000-tons/month requirements. Japanese output: about 30,000 tons/year; inventories: about 17,000 tons.

•

A new group of styrene-butadiene copolymer resins is nearing commercial production this week. According to trade reports, Humble Oil & Refining Co. is now in the first stages of starting up its plant at Baton Rouge, La., to make Buton resins.

Actually, commercial production will be carried out at two sites, Baton Rouge and Bayonne, N. J. Combined output from the two plants will be 10 million lbs./year, but could be easily doubled to about 20 million lbs./year (*CW, Butylene Report, May 28, p. 68*). The resins will be aimed at the surface coating and plastic laminate markets.

•

Prices of two major plastic products in British markets have been reduced in the past two weeks. Cuts of 4-7% in solid-grade epoxy resin prices went into effect last week, while polystyrene tabs were slashed about 3½¢/lb. the previous week. Shell Chemical Co., Ltd., initiated both moves. Other companies are reported to be going along with the epoxy price cut.

For polystyrene, other British polystyrene manufacturers, such as British Resin Products Ltd., B X Plastics Ltd., Monsanto Chemical Ltd., are following the new schedule. Behind the polystyrene price drop: the recent startup of Shell's styrene monomer plant at Carrington (near Manchester), plus increased capacity from the polystyrene unit.

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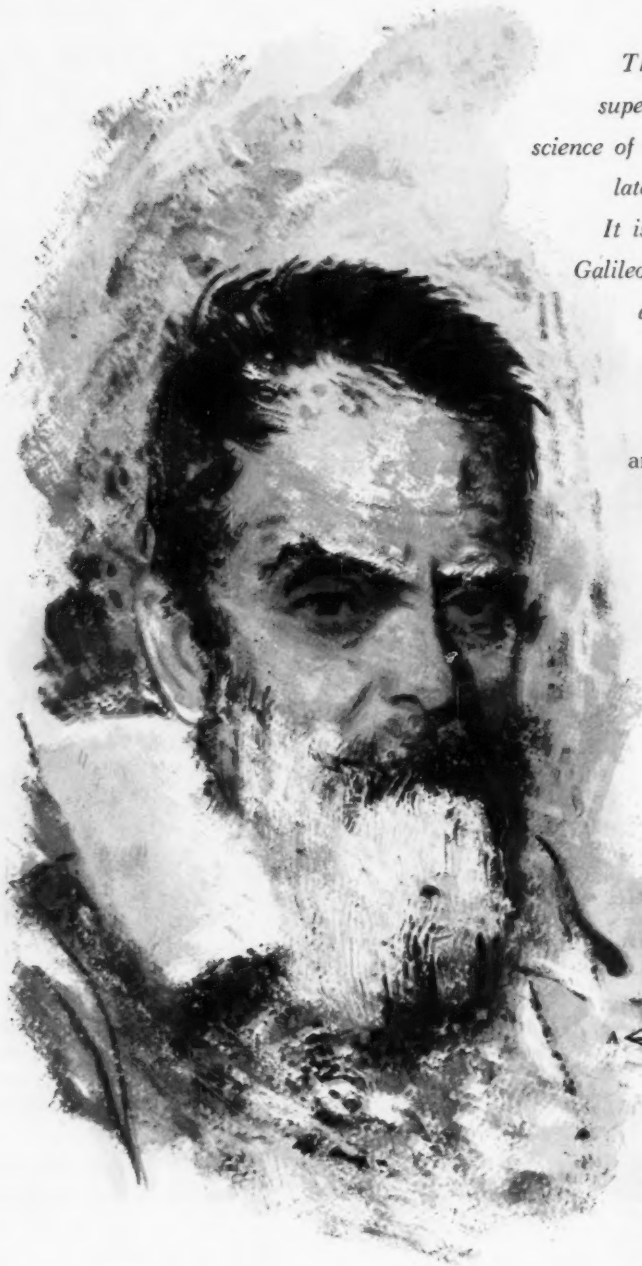

The mind of Galileo—keenly analytical, superbly trained—led him to founding the science of experimental physics, which, centuries later, is revealing the mysteries of space. It is self-evident by his achievements that Galileo's mind reached a level of quality far above ordinary standards of excellence.

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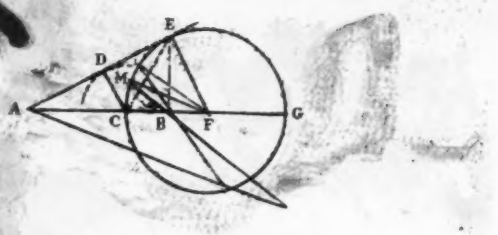

"The knowledge of a single fact through a discovery of its causes prepares the mind to understand and ascertain other facts..."
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Strategic Materials' Chambers:
He counts on SUMAC
to provide the final proof.

Pushing Strategic-Udy to Profit Showdown

Work is moving ahead full speed this week on Strategic Materials Corp.'s new $1.5-million plant at Niagara Falls, N.Y., to convert hitherto unusable chromitic and lateritic ores into stainless steel. And in three other widely-scattered locations, the Strategic-Udy smelting process is similarly nearing payoff time, offering firmest evidence yet of the widening commercial acceptance and flexibility of the S-U process.

Essentially, the facilities nearing completion are steel plants, but there's broad variation in starting materials, by-products, and type of organization set up to operate the plants. For example, Strategic Materials will run the Niagara Falls plant for Universal Cyclops Steel Corp., which will buy the output and market under an agreement signed last month (also at that time Cyclops President W. G. Stewart was elected to Strategic's board). It is licensing two other plants, will likely operate the other itself. Here's the rundown:

• **Smelting Venezuelan Ore:** The Venezuelan government disclosed last month that it is using the Strategic-Udy process in a new plant which will have a capacity of 1.2 million tons/year—estimated to be the world's largest electric furnace steel plant. The Strategic-Udy process was chosen for this plant because it can economically smelt Venezuelan ore with low-grade Venezuelan coal, avoid coke imports.

• **Making Texas Steel:** Two Texas steel companies, Lone Star Steel (Dangerfield) and Sovereign Steel of Texas (Palestine) are planning plants which will use the Strategic-Udy process to make steel from low-grade (under 50% iron) Texas ore. Work on the Lone Star plant is just getting under way, while the Sovereign plant (1000 tons/day capacity) is well into engineering and expected to start up early in '62.

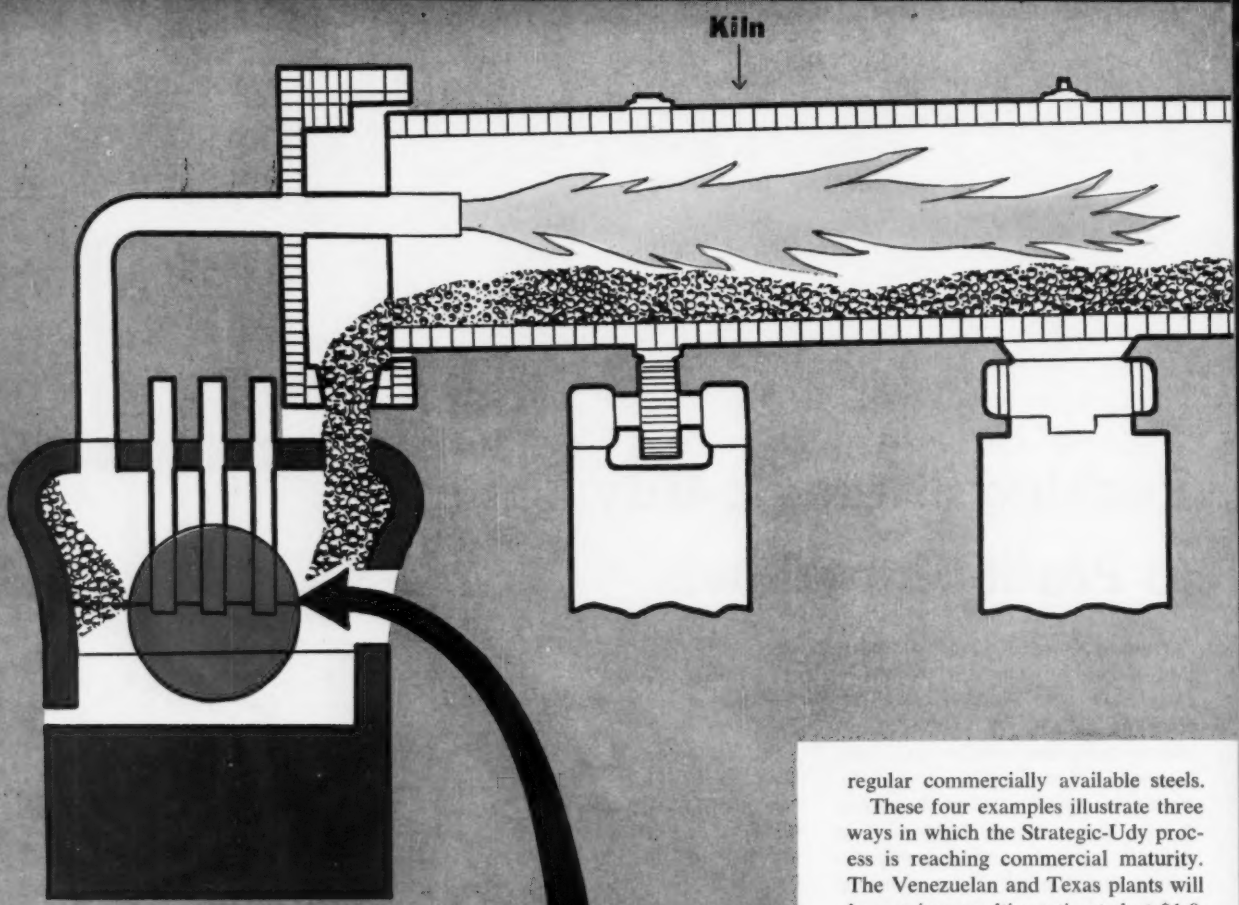
• **Titaniferous Ores:** Strategic Materials disclosed last month that it has purchased a 100% interest in a titaniferous magnetite iron deposit in the Saguenay District of Quebec. This deposit, which is estimated to contain over 2 billion tons of ore with about 45% iron and 12% titanium dioxide, is billed as the world's largest iron lode.

In the past, these ores have never been considered worth shipping to smelters, because it was impossible to separate the titanium dioxide. The Strategic-Udy process, however, has been able to economically produce an iron that contains less than 0.05% titanium and only traces of vanadium and chromium. In addition, the process has been able to make a slag from titaniferous ores that contain enough titanium dioxide for further economical processing into white pigments.

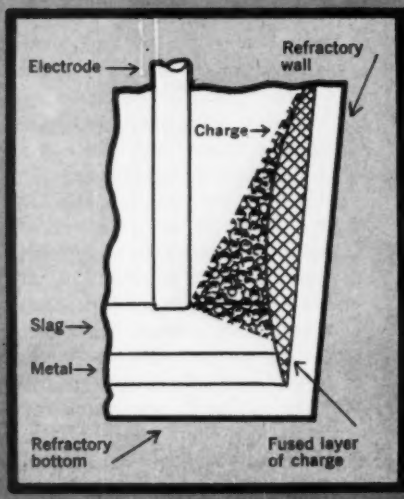
The far-reaching significance of all these is overshadowed, however, by the lateritic and chromitic ore smelting that Strategic-Udy Metallurgical and Chemical Processes, Ltd. (SUMAC) will do for Universal Cyclops at the new plant in Niagara Falls, Ont. Lateritic ores, to which it gives sudden value, lie near the earth's surface in a broad belt around the equator, thus are a boon to underdeveloped countries, while the chromitic ores are found in large Canadian deposits which can make North America independent of imported chrome.

This plant will also have the additional advantages of (1) a one-step conversion bypassing the blast furnace to make steel (*CW, Dec. 26, '59, p. 34*) and (2) stainless steel product with superior properties. These properties are believed due to absence of small amounts of tramp alloys that are present in steel made from scrap. SUMAC has already produced development quantities of this steel in ASTM grades 301 and 430. They have been rolled and the sheets sent to a large automobile manufacturer which reports them easier to handle than his

Open Slag: Key to Strategic-Udy



Electric furnace



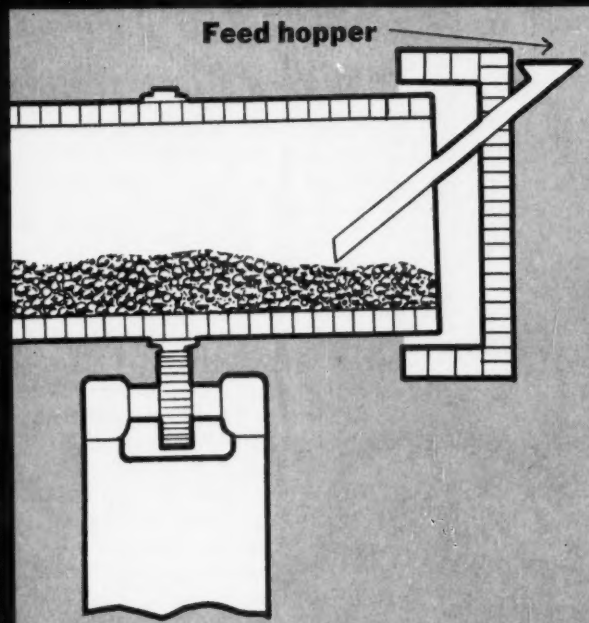
Electrodes are partly submerged in molten slag, with the solid charge kept back from the electrodes — the so-called open bath. Result: charge with high metallics content (up to 95%) can be used, and the open bath prevents accumulation of hazardous gases

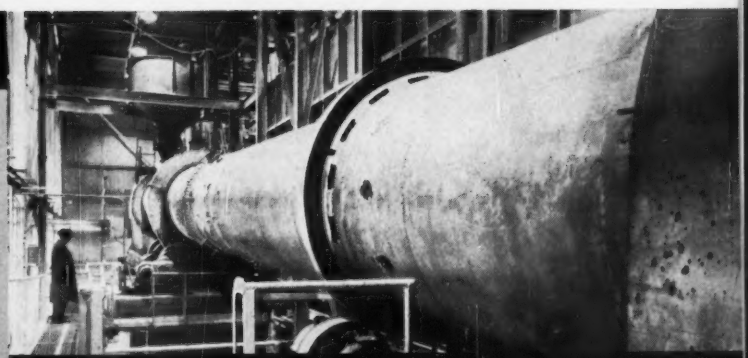
regular commercially available steels.

These four examples illustrate three ways in which the Strategic-Udy process is reaching commercial maturity. The Venezuelan and Texas plants will be earning royalties estimated at $1.0-1.5 per ton as soon as they start up. The titaniferous ore property is an investment, by Strategic Materials, in mines made valuable by the S-U process. And the agreement with Universal Cyclops shows Strategic-Udy going into manufacturing on its own.

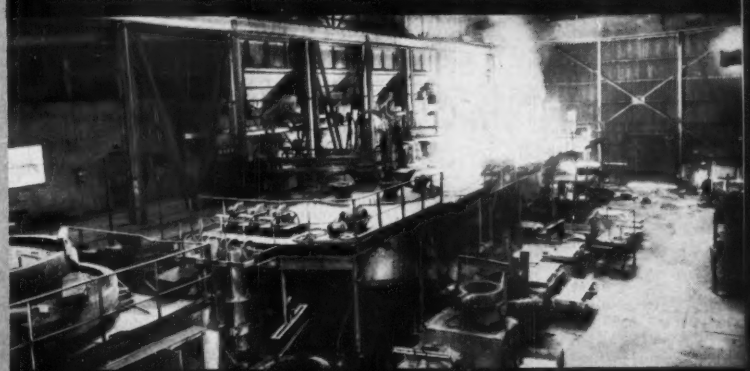
What Lies Ahead: The flexibility demonstrated by these projects is hardly apparent to other than metallurgical experts. It may be easy to visualize how Strategic-Udy has replaced metallurgical coke by coal in putting the blast furnace stack on its side and coverting it to a rotating kiln. Or easy to see how carbon contamination is avoided since the coke is no longer forced down into the molten metal in the hearth. Or even easy to understand how the smaller structure requires smaller capital investment than a blast furnace. But the secret to processing flexibility lies in the chemistry of the molten slags which

Flexibility





Kiln at SUMAC plant is 80 ft. long, 4 ft. in inside diameter.



Three furnaces are in smelting bay at SUMAC prototype plant.

float on top of the metal bath and extract impurities—along with close control of the reducing reactions in the kiln.

These are secrets which Strategic Materials has been able to open up only after continued operation of the pilot plant operated by Strategic-Udy Processes, Inc. (SUPI) at Niagara Falls. The wide range of know-how involved in the technique is illustrated by the number of firms that have joined with the original Strategic Materials Corp. These are: Koppers Co., Inc. (design and construction of steel plants), Elektrokemisk A/S of Oslo, Norway (world's largest builder of electric furnaces), and Traylor Engineering & Mfg. Co. (builder of rotary kilns). In addition, Strategic Materials' board of directors has representatives from Samuel J. Bloomingdale Foundation, Colorado Fuel and Iron Corp., National Gypsum Co., and North American Coal Co. Most of these companies have teams of technicians working with the Strategic-Udy experts both in and out of the SUPI plant.

This group has been working continuously on a set program of pilot plant and semicommercial tests to build up know-how and to explore the economic limits of the process. Tonnage batches of ore and available fossil fuels are received from all parts of the world and converted into steel or other metallic products. Primary chemistry and metallurgy of the smelting operations are studied at SUPI. Processing is done in a 100-KVA smelting furnace and a 20-foot long rotary kiln. Semicommercial quantities for testing and process development are manufactured at SUMAC, where they are processed in three 1000-KVA-(3 ton) electric furnaces and a 4.5-foot diameter by 80-foot long kiln. To date, 84 projects have been handled in this manner.

How It Works: The single key feature which makes all these processes possible is Strategic-Udy's electric furnace, which transmits heat by a submerged electric arc in a bed of molten slag that floats on the bath of metal in the hearth. Temperature can be controlled by raising or lowering the electrodes; and the slag is exposed, permitting reduction gases to escape.

By contrast, both the blast furnace and conventional electric furnaces cover the hearth with lumps of ore, coke and stone. Reducing gases rise through these lumps, carrying out the primary reductions. As the metals and slags melt, they trickle down through the lumps into the hearth. The melting products must be kept fluid, therefore, or they will tend to trap the rising gases, causing the blast furnace to "hang" (*CW, Apr. 23, p. 53*)—or the electric furnace to explode. Both temperature and chemical composition are limited by the viscosity of the slag.

In the Strategic-Udy process, reducing gases are contacted with the ores and stone in the kiln. Rate of reduction is controlled by introducing the carbonaceous reducing material at several points, so that about 55% of the ores are reduced to metallic fines. This gives a mixture which pours "like water" into the furnace. Here, the remainder of the ore is reduced, while more slagging materials (dolomite stones, limestone, etc.) are added to extract undesired alloys and metallic oxides.

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Another feature: a metal lower in the table will reduce the oxide of one higher up. Equilibrium is therefore most important. At the temperatures of molten slag all the reactions are fast, when contact is made and if energy is supplied from the electrodes. Finally, the slags may be tapped off intermittently and reprocessed to reduce further metals, until all the metals in the initial ore have either been dropped out as pure metal or their oxides concentrated in the slags.

ORDER OF REDUCTION BY FREE ENERGIES (AT 2500 F)

Copper (Cu_2O)
Nickel (NiO)
Cobalt (CoO)
Iron (FeO)*
Chromium (Cr_2O_3)
Manganese (MnO)
Titanium (TiO_2)

*** Iron reduction actually begins before copper; Fe_2O_3 goes to FeO.**

With its current list of commercial applications backed up by such a wide variety of possibilities and a sound metallurgical basis, the Strategic-Udy process sometimes seems versatile enough to recover almost all minerals from the earth's crust. As such, it begins to look like a competitor of hydrogen.

In the face of this, Strategic Materials executives are more anxious to present a conservative attitude than to promote enthusiasm.

Says F. W. Chambers, president of Strategic Materials, "While developments of this nature are very inspiring and our personnel are fully confident of success, the fact remains that many companies will pass judgment only after commercialization."

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in lacquers...

in melt coatings...

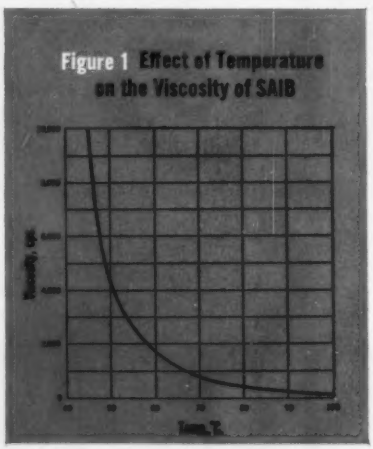
IN PLASTICS SAIB speeds processing... improves properties of molded and extruded cellulose acetate plastics

When used in conjunction with dimethyl phthalate and other common plasticizers, SAIB offers processors of cellulose acetate plastics easier dry blending, faster molding and extrusion rates, and improved physical properties.

By reducing the cold solvency characteristics of the more active plasticizers during dry blending, SAIB promotes faster and more even distribution throughout the cellulose acetate mix.

SAIB has an extremely high viscosity index (see Fig. 1). At 70°C., the viscosity is less than 1,000 centipoises. Below 70°C., a sudden and sharp increase in viscosity occurs. At room temperature, SAIB is a semi-solid. At processing temperatures, SAIB aids in plasticization, resulting in faster, more uniform flow through molding and extrusion cylinders. At room temperature, the opposite effect occurs: SAIB stiffens the plastic and increases its surface hardness. This unusual behavior of SAIB permits molding and extrusion conditions applicable to a material one or two flows softer than its hardness at room temperature would indicate.

Figure 1 Effect of Temperature on the Viscosity of SAIB



The presence of SAIB also increases rigidity and tensile strength, and decreases weight loss on accelerated aging of cellulose acetate formulations.

IN MELT COATINGS SAIB extends peelable coatings... lowers application temperatures of hot melts.

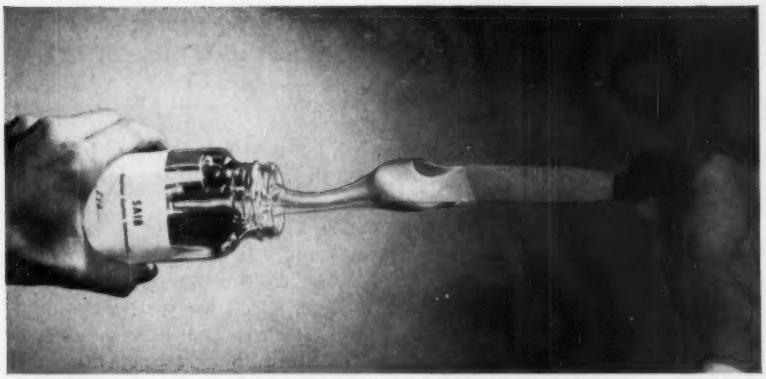
The excellent permanence, compatibility and stability characteristics of SAIB result in improved hot melt and peelable plastic formulations.

Tough, flexible melt coatings that do not fume at melt temperatures can be formulated containing up to 70% SAIB. Operating temperatures are reduced, too. In butyrate hot melts, for example, high modification with SAIB permits an application temperature of 275°F. instead of the usual 350°F.

In ethyl cellulose compositions, SAIB reduces mineral oil exudation through its solubilizing effect, thus permitting use of greater amounts of oil. In peelable coatings, SAIB maintains flexibility because it improves resistance to exudation.

IN LACQUERS SAIB produces high-solids content cellulosic lacquers at practical application viscosities...improves sprayability of vinyl and acrylic lacquers... increases adhesion to Mylar polyester film and nylon.

The high degree of compatibility exhibited by SAIB with virtually all major film-formers coupled with its exceptional solubility in most common lacquer solvents (see table in the next column) permits the formulation of high-solids lacquers at practical application viscosities.



SAIB has an average molecular weight of 838 and a compact molecular structure. It has an extremely high viscosity index. (At room temperature, it is a semi-solid. At 70°C., its viscosity drops to less than 1,000 cps. At 100°C., it is only 100 cps.) SAIB is light in color and unusually stable to ultraviolet light. It exhibits outstanding hydrolysis and thermal stability. (Less than 0.1% is hydrolyzed after refluxing 96 hours with water. Heated to 175°C. for a period of 6 days, its color increases slowly to straw yellow, with no appreciable change occuring until after 24 hours of heat-aging.) SAIB is compatible with a wide variety of polymers, modifiers and plasticizers, and is highly soluble in common lacquer solvents. (A 90% solution of SAIB in ethyl alcohol has a viscosity of only 750 cps. at 30°C.)

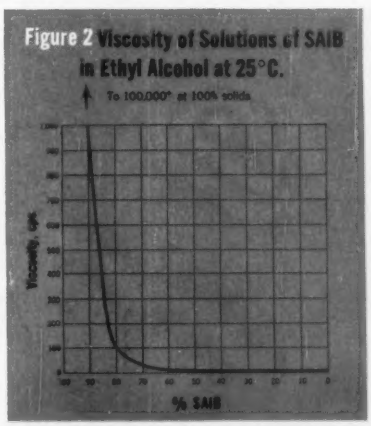
Viscosity of 50% SAIB Solutions

(Brookfield viscometer, 25°C.)

Solvent	Viscosity, cps.
Ethyl alcohol	8
Isopropyl alcohol	14
Ethyl acetate	8
n-Butyl acetate	9
Toluene	9
Hexane	6
Methyl ethyl ketone	6
Methyl isobutyl ketone	8
1-Nitropropane	11

Note that these data are for 50% solutions. Let's consider now the viscosity of SAIB solutions at higher concentrations. The case for ethyl alcohol is shown in Fig. 2. Similar viscosity-concentration relationships exist between SAIB and other common lacquer solvents.

From this graph it can be seen that at the highest conceivable concentration at which SAIB might be used to modify a lacquer system, its effect on solution viscosity is negligible. Even after much of the solvent has evaporated from the film, SAIB does not hinder flow-out or leveling. While this behavior might also be observed with certain plasticizers, SAIB does not exhibit plasticizing properties.



With nitrocellulose, for example, the Sward hardness of a 50% SAIB-modified film is increased from 65 to 78. Cellulose acetate films also are increased in hardness upon addition of SAIB. In this case, however, maximum hardness occurs at a concentration of about 25%. With cellulose films other than nitrocellulose and cellulose acetate, high modification produces only a slight decrease in hardness with no significant change in solution viscosity.

Lacquers that show very good adhesion to Mylar polyester film and nylon (and heat sealable, too, if desired) can be formulated with SAIB and Half-Second Butyrate. Vinyl and acrylic solutions modified with SAIB show improved sprayability with less cobwebbing tendency. Greater flexibility for SAIB-modified polymers can be achieved, if necessary, by including small amounts of Eastman polymeric plasticizer NP-10.

Acting as a plasticizer under certain conditions and as resin-modifier or -extender under others, SAIB is truly a multi-functional material. Its unique behavior, combined with its low color, stability and moderate cost, make SAIB a compound worth looking into now.

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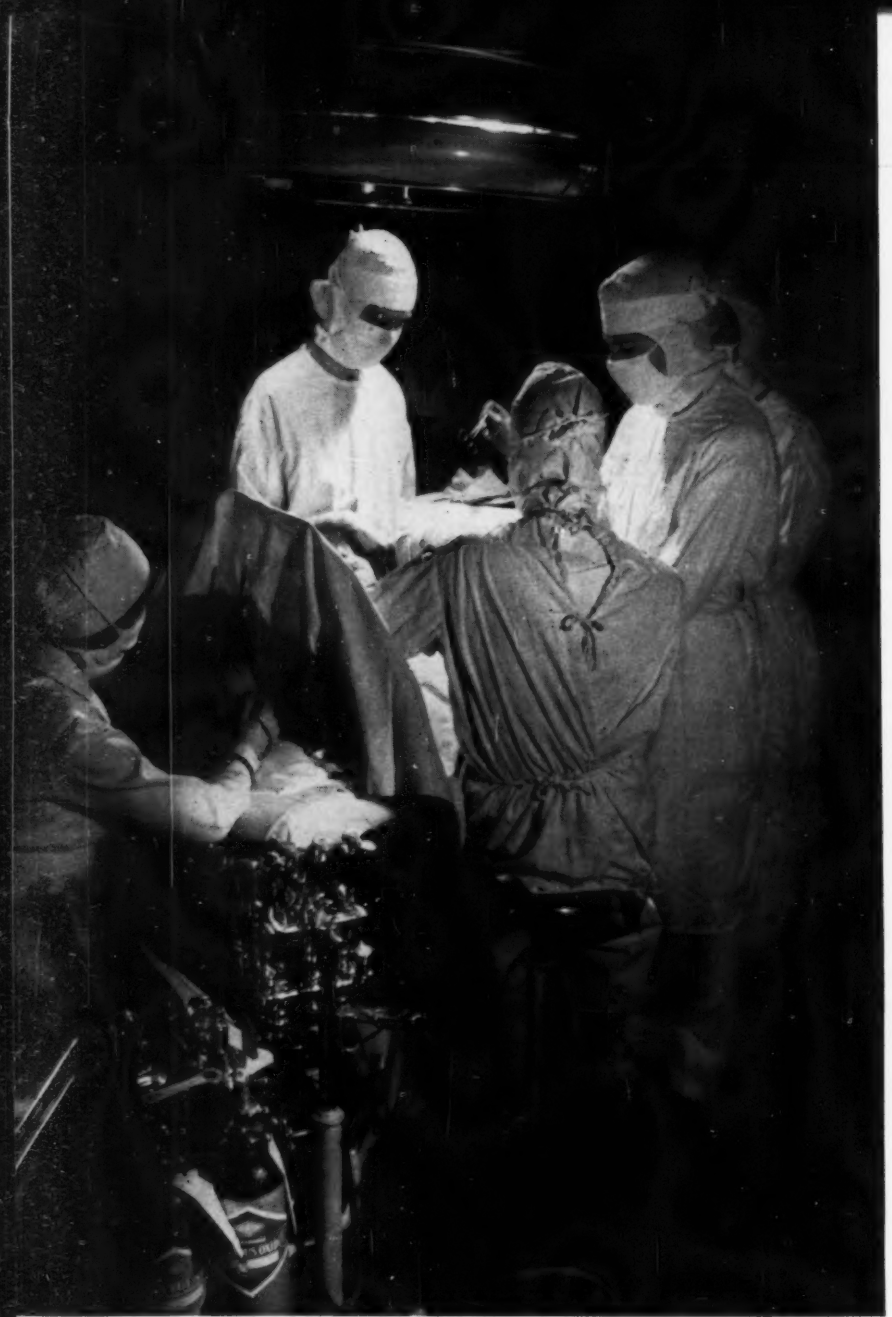


Half of all operations in hospitals require use of anesthetic gases.

Hospitals Hike their Gas Bill

When the new Methodist Evangelical Hospital in Louisville, Ky. opens its doors next month, a 1,600-gallon liquid oxygen converter will be pumping oxygen into every room like running water, will enable the hospital to cut its costs for the life-giving medical gas by 30%. Nearly all new hospitals are adopting this system of using oxygen.

For the chemical industry, this trend—plus latest figures showing that voluntary health insurance in the U.S. is at a record high—will mean an estimated $35-40 million this year in sales of medical gases and equipment for their administration.

And a conservative prognosis for the decade ahead is that the medical gas market will hit the $50 million/-year mark before '70, spurred by even wider insurance coverage and birth of new communities, bringing with them new hospitals, doctors and dentists.

The Big Six: Core of the medical gas industry is made up of six gases: nitrous oxide, cyclopropane, and ethylene, which are used exclusively as anesthetics; and oxygen, carbon dioxide, and helium, which are mainly therapeutic gases. Other gases—like the rare xenon—are currently under study as potential anesthetics, but now must be classified as strictly in the experimental stage.

Some 10 million anesthesias are administered annually, about half of them by gas. Other methods are by liquids (like ether), which represents about 20% of all anesthesias, and those given intravenously, such as the increasingly popular sodium pentothal.

The main market for medical gases is roughly 10,000 hospitals and clinics in the U.S. Some 95% of the entire gas business goes to hospitals, while the remainder is sold to dentists and doctors.

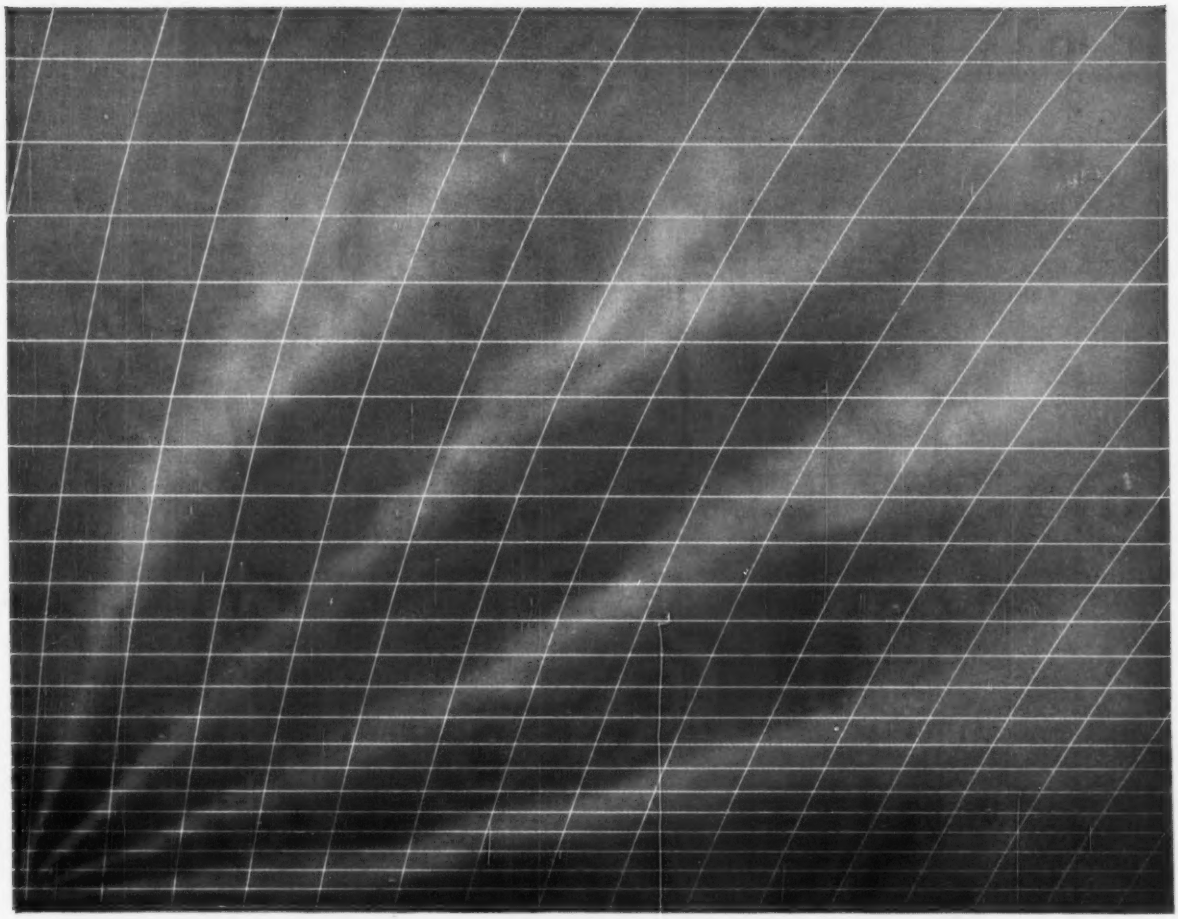
Nitrous oxide and oxygen are the workhorses of the medical gas field, and in terms of sales they're probably the biggest money-makers for the industry. Nitrous oxide, also called laughing gas, has been used in this country since the middle of the 19th century. Today, it's the chief anesthetic tool of dentists. The gas is also a mainstay in surgery when supplemented with other anesthetics. Between 150 million and 175 million gallons are produced each year.

Oxygen, mixed with other anesthetics, comes into play in the operating room. It's now used generally in postoperative recovery and in the treatment of respiratory ailments.

Producers' Lineup: The medical gas industry was born in the U.S., and today this country still ranks as the leader in production and consumption. Among the first companies to get into the business were the S. S. White Dental Mfg. Co. (Philadelphia), which specializes in nitrous oxide; and Puritan Compressed Gas Corp. (Kansas City, Mo.), which makes and distributes nearly all the various medical gases. Both firms are still big producers.

Three other important producers were once independent companies but

With a variety of evaporation rates...



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Gas	Use
Oxygen	Most widely used gas, it serves as therapeutic agent, anesthetic, and post-operative aid in recovery.
Carbon Dioxide	Used in lab as a freezing agent in biopsies. Is mixed with oxygen for recovery of respiration after surgery.
Ethylene	Light, general anesthetic commonly used in obstetrics.
Cyclopropane	A potent anesthetic, used in obstetrics.
Nitrous Oxide	Light general anesthetic often supplemented with other anesthetics for deep sleep. Wide use by dentists.
Helium	Helps carry oxygen to the lungs in surgical anesthesia.

are now divisions of large industrial and chemical companies: Ohio Chemical & Surgical Equipment Co. (also one of the pioneers) (Madison, Wis.), a division of Air Reduction Co.; Liquid Carbonic Division of General Dynamics (Chicago); and National Cylinder Gas Division of Chemetron Corp. (Chicago).

Others competing in this field are Thomas A. Edison Industries (Orange, N.J.); Mallinckrodt Chemical Works (St. Louis); E. R. Squibb Co. (New York); Linde Co., division of Union Carbide Corp. (New York); and American Oxygen Service (Harrison, N.J.).

Big Investment Required: The predominance of large companies can be attributed to the heavy investment required to get into the medical business and, afterwards, to operate in it. Companies emphasize that it's an expensive proposition to built plants, set up a distribution system and maintain big sales staffs. Puritan, for example, which operates both domestically and abroad, has 60 salesmen, Liquid Carbonic, 45.

In addition, since prices are competitive and products standardized, companies must stress service and dependable delivery to their customers.

An important marketing trend today is toward selling—or at least supplying—equipment for the administration of the various gases. National Cylinder Gas, Ohio, and Puritan manufacture their own equipment.

Selling the Hospitals: Although a hospital's administrator makes the final decisions of what and where to buy, the anesthesiologist exerts the greatest buying influence for anesthetics. (All transactions are ultimately arranged through a hospital's purchasing department.)

Gases are usually sold on contract, generally on a one-year basis. All gases must meet U.S. Pharmacopoeia purity standards. Therefore, the important factors in selecting a supplier boil down to local availability and technical service. As a result, salesmen today are much more knowledgeable about their products than they used to be.

Individual doctors and dentists buy directly from the manufacturer or through dealers (there are said to be hundreds) who also supply medical equipment.

One County's Purchases: In Los Angeles, for example, a county purchasing committee buys anesthetics for its six county hospitals, totaling about 10,500 beds. Purchases are on a bid basis.

Last year, the group bought 198,000 cu. ft. of nitrous oxide, 48,000 gallons of cyclopropane, 600 gallons of ethylene, and 18,000 cu. ft. of carbon dioxide.

New drugs and anesthetics are submitted to a special committee made up of doctors from each of the six hospitals, their pharmacists, plus two outside doctors. The committee makes the final decision, based on their tests.

Continuing Research: Medical gas suppliers are engaged in constant research to find improved anesthetics, better manufacturing processes and safer equipment. Ohio Chemical, for example, is tackling the problem of finding better ways to make nitrous oxide and cyclopropane.

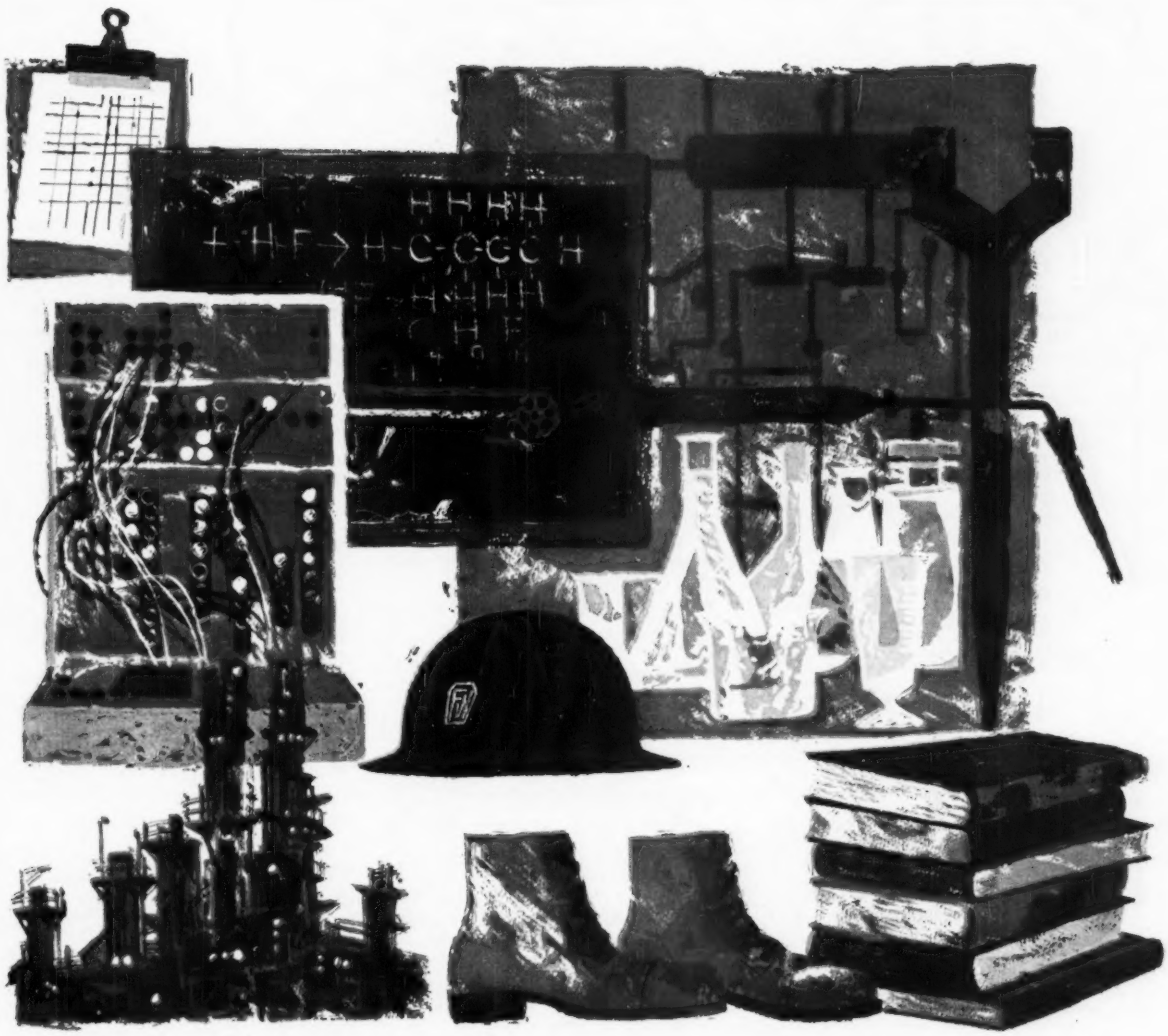
Puritan is now conducting an extensive research program on xenon for use in anesthetics, is also working with the University of Kansas Medical Center and School of Medicine on other research problems.

Competition from other types of anesthetics is one reason for research activity by gas suppliers. Some of the others have already made sharp inroads on the gases' share of the market. Intravenously injected drugs, for example, now account for 30% of the anesthetic market—and their use is on the uptrend.

Meanwhile, brand-new products continue to appear. The latest significant addition to the anesthetic family is not a gas at all. Fluothane, a liquid (like ether), is gasified before inhalation. A satisfactory general inhalation agent, it has the advantage of being nonexplosive, the disadvantage of being expensive. Fluothane is said to be having an effect on the sales of cyclopropane and ether.

S. S. White observes, however, that sales of nitrous oxide, its big seller, are rarely affected for long by the introduction of a new anesthetic. From experience they have observed that nitrous oxide consumption may drop off slightly but always recovers and resumes a gradual climb.

Healthy Future: All signs point to a long and healthy life for the medi-



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***For complete product data see catalog unit in the BUYERS' GUIDE ISSUE for 1959-60**

cal gas industry. The use of gases has increased tremendously in the past 30 years. At one time doctors hesitated to recommend therapeutic gases because of the trance-like effect on the patient. Today, gases are commonly utilized for recovery and for alleviation of pain, and administered in ambulances, doctors and dentists' offices, and in patients' homes.

Over the past 10 years the number of hospital beds (civilian) has risen 30%, while the population has increased 20%. Hospital admissions have climbed over 50% during this period, due mostly to Blue Cross and other medical plans. (Blue Cross covers the use of oxygen in both home and hospital, as well as anesthesias.)

The continuing trend to more widespread medical care is guaranteeing a solid future for medical gases.

PRODUCTS

Rubinstein's Acne Line: Helena Rubinstein, Inc. (New York) will soon introduce a new line of medicated cosmetics aimed primarily at teen-agers affected with acne. Main product in the line will be Bio-Clear Medicated Cream containing an organic sulfide, dibenzothiophene. Other products in the new line will be a liquid cleanser, pore lotion, shampoo, liquid make-up, granulated cleanser, soap, and beauty mask. Introductory kits containing three of the products will go on sale Aug. 15 and retail for $2.95. Full line will hit counters in October.

•

Sequestrant: Gray Chemical, Inc. for sequestering and emulsion-stabilfering TEAC-90, an organic liquid for sequestering and emulsion stabilizing. It's said to show exceptional ability to sequester ferric iron and copper in strong alkaline solutions.

•

Coagulant Aids: Dearborn Chemical Co. (Chicago) is selling a new line of coagulant aids, Aquafloc, for more efficient removal of suspended and precipitated solids from water in sedimentation tanks, softeners, or filters. The products are said to reduce treatment costs, may be used alone or with standard coagulants. The series includes Aquafloc 420, a nonionic coagulant aid; Aquafloc 422 for potable water systems; and Aquafloc 425 in anionic form.

Tracers

TO THE CHEMICAL PROCESS INDUSTRIES

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Production Manager-new Chlorine Plant—Write for interview giving experience. Kolker Chemical Corp., 600 Doremus Ave., Newark, N. J.

Vinyl Compounder for electrical wire compounds. Strong capability and leadership required to handle full-range p.v.c. wire coating product development and control. Company expanding; offers fine growth opportunity, good salary and benefits. Metropolitan area. Reply to P-0562, Chemical Week stating experience.

SELLING OPPORTUNITIES AVAILABLE

French Chemical Import Distributing Firm look- ing for exclusive agency in paint plastic electronic raw materials. Call up to August 19th, NYC CO 5-6100 Mr. C. Richard or wite A.M.C. 9 Av. F. D. Roosevelt, Paris.

Agents Wanted: Sell our laboratory controlled reprocessed by-product chemicals—Amines, Glycols, Polyethylene Waxes, Fatty Acids, Styrenes, GRS Latices, Secondary Plasticizers, Aluminum Silicates, Solvents. Our products sell up to 40% below current chemical market. Hot leads and active accounts turned over to sales producers. Aggressive representation especially needed in Eastern and Southern territories. Replies held in confidence. RW-5052, Chemical Week.

Industrial Chemical Salesman; Aggressive chem- ical mfgr. offers excellent growth opportunity for representative with minimum 3 yrs. field experience. Chemical or chemical Engineering degree or equivalent necessary. Under 35 yrs. old and free to travel and relocate. Salary commensurate with experience. Travel expenses, company automobile, and benefit program. Send resume to: Carlisle Chemical Works, Inc., Reading, Ohio.

POSITIONS WANTED

Marketing Manager with or without sales staff available for progressive chemical manufacturer interested Southeast textile finishing industry. PW-5040, Chemical Week.

Polyester-Fiberglass-Reinforced Plastics. Mar- keting or Product Development. Chemical Engineer. Broad Management and sales experience. Ambitious. PW-5059, Chemical Week.

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SELLING OPPORTUNITIES WANTED

Western German Chemical Manufacturer and Dealer specializing in solvents, heavy and fine chemicals, intermediates, seeks European or West-Germany agency arrangements with United States suppliers; plant and offices located near Frankfurt-Main. Manufacturing of proved products under license possible. Replies treated in strict confidence. If interested please contact RA-5045, Chemical Week.

West Coast Plastics Sales Agency—2 aggressive & widely known young sales & engineering executives, SPI & SPE, plan distribution of selective specialty resins, machinery & equipment lines for plastics. Commission or distributor. Outstanding reputation, very best references. Will be East September. RA-5053, Chemical Week.

Salesman, 8 yrs. technical sales experience in Washington D.C. desires to represent company in Washington area. Minimum salary $8500. RA-5032, Chemical Week.

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Louisville 7' dia. x 70' long Rotary Kiln, ½" welded shell, firing hood, burners, vari-drive, etc. 1952 late model unit, Perry Equipment Corp., 1415 N. Sixth Street, Philadelphia 22, Pa.

Reaction kettles—Synthetic Resin Units 1- 18,000 lb. charge stainless with agitator coils condensors, etc. including new "Selas" gas heating unit. 1-18,000 lb charge stainless with agitator coils, condensors, etc. heated by a "Trent" electric jacket. 1-10,000 lb. charge stainless with agitator coils, condensors, receiver etc. jacketed for "Arochlor" electric heater. All kettles in equal to new condition and being replaced by larger units by new resin manufacturer. FS-5027, Chemical Week.

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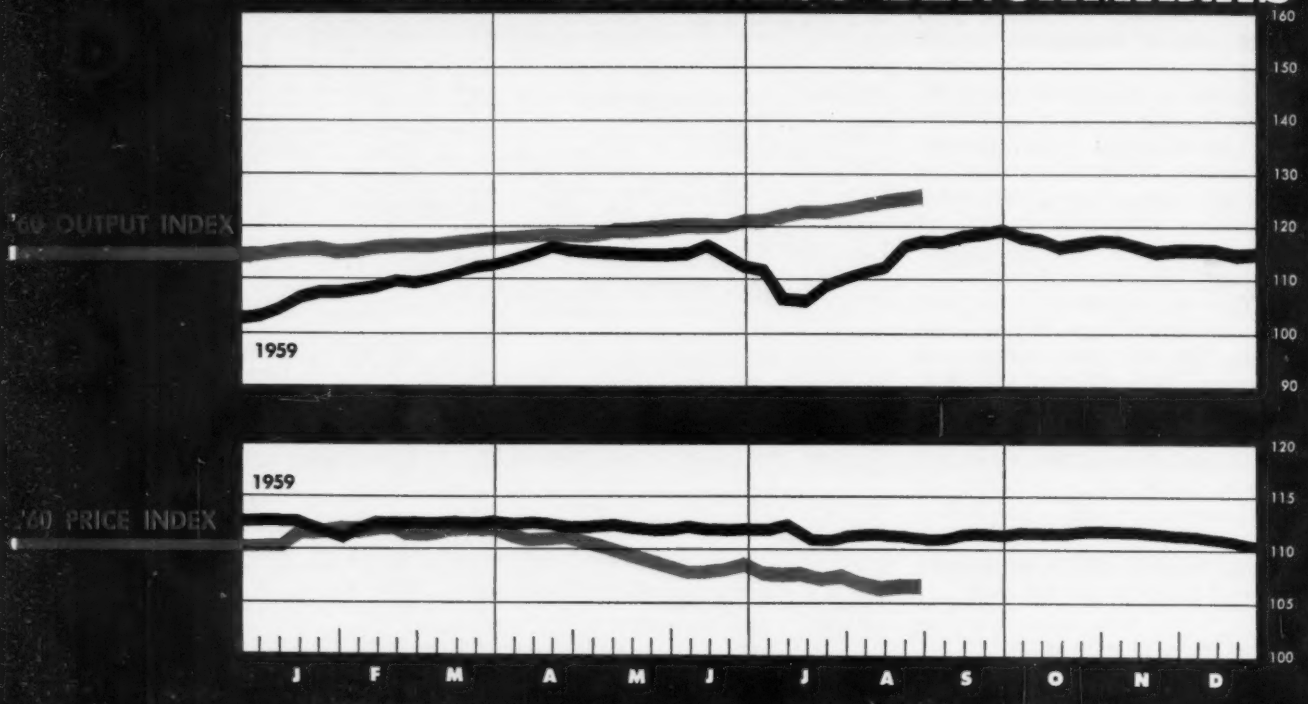

AUGUST 13, 1960

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1957=100)	126.5	127.0	112.2
Chemical Week wholesale price index (1947=100)	107.3	107.3	110.8
Stock price index (12 firms, Standard & Poor's)	46.99	47.05	61.60
Steel ingot output (thousand tons)	1,570	1,520	318
Electric power (million kilowatt-hours)	14,746	(14,425	13,775
Crude oil and condensate (daily av., thousand bbls.)	6,821	6,855	6,808

MONTHLY INDICATORS—PRODUCTION 1957=100	*Latest Month*	*Preceding Month*	*Year Ago*
All manufacturing	110	110	111
Nondurable goods manufacturing	115	114	111
Durable goods manufacturing	106	107	111
Chemical and allied products	124	124	115
Industrial chemicals	129	129	120
Petroleum and coal products	109	105	108

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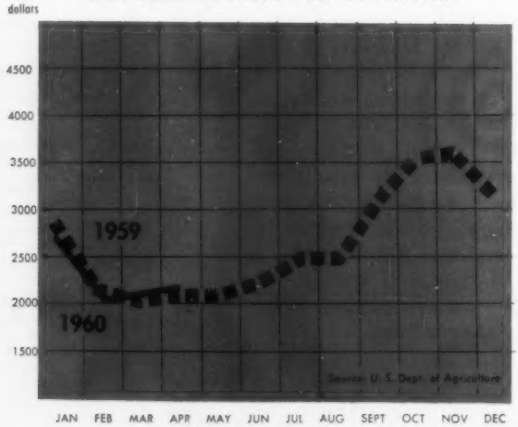
CASH RECEIPTS FROM FARM MARKETINGS



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